DEALER'S
SERVICE MANUAL

MODEL "G" TRACTOR

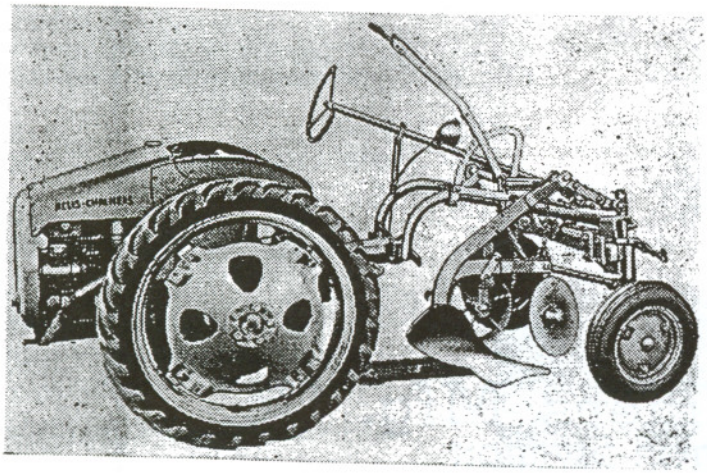
Allis-Chalmers Mfg. Co.
TRACTOR DIVISION
MILWAUKEE, WISCONSIN
U. S. A.

#CU 279 X1

ALLIS-CHALMERS MANUFACTURING CO.

Milwaukee, Wisconsin

Allis-Chalmers Model "G" 1948-1958
Allis-Chalmers HD19H 1948



ALLIS-CHALMERS MODEL "G"
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Air Cleaner: Donaldson, oil bath.
Battery: Auto-Lite.
Brakes: Two, operated by foot pedals.
Carburetor: Marvel-Schebler, ⅝ in.
Clutch: Rockford, single dry plate.
Generator: Delco-Remy.
Governor: Continental, centrifugal.
Ignition: Delco-Remy, distributor and coil.
Lamps: Guide Lamp.
Oil Filter: Own.
Radiator: Perfex or McCord, fin and tube.
Radiator Cover: .....
Spark Plugs: Auto-Lite AN-7.
Starting: Delco-Remy.
Data: H.P.—Neb. Test No. (not tested). Number of plows recommended: One, 12-in.
Engine: Continental N-62; 2⅜x3½, 1800 r.p.m., 4 cylinders, L-head, cast en bloc. Piston displacement 62 cu. in.
Pulley: 6x4, 1950 r.p.m. and 3070 f.p.m. at normal engine speed.
Speeds: M.P.H. Forward 1.58, 2.19, 3.46, 6.71 and 2.54 reverse.

The engine for the model "G" tractor is mounted in the rear of the tractor. For purposes of identification, the engine will be referred to as crank end, flywheel end, manifold side and generator side. The No. 1 cylinder will be at the crank end of the engine.

The design of the model "G" tractor lends itself to a variety of procedure for following practical repair work. The following general procedure may be followed in removing major assemblies from the complete machine.

The complete engine may be removed as a unit. The engine must be removed to do any repair work on the clutch, throwout bearing, flywheel or oil pump.

The engine and clutch housing may be removed as a unit if the differential is to be removed or the transmission dismantled.

Removal of the complete engine assembly or of the clutch housing must be made if the belt pulley drive gear or engine intermediate gears need servicing.

The adjustment of the transmission shaft bearings and removal of the special low reduction gear may be accomplished if the torque tube is removed from tractor.

If the complete transmission and differential is to be repaired, the torque tube, the engine, clutch housing and the two wheel axle assemblies must be removed.

* * *

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ENGINE

ENGINE

Type	L-Head 4 cycle
Cylinders	4
Bore	2-3/8"
Stroke	3-1/2"
Piston Displacement	62 Cu. In.
Engine Speed Full Load	1800 R.P.M.
Engine Speed High Idle	2100 R.P.M.
Engine Speed Low Idle	500 R.P.M.
Compression Ratio	
Prior to Eng. 23988	5-3/4 to 1
Eff. On Eng. 23988	5-5/8 to 1
Firing Order	1-3-4-2
Rotation	Clockwise
Compression Pressure (Starter Speed)	90 to 95 lbs.

AIR CLEANER

Type	Oil Bath
Capacity	1/2 pint

CAMSHAFT

Journal Size	
Front & Center	1-3/4"
Rear	1-1/4"
Clearance	.003" to .0045"
Replace-maximum	.007"
Thrust Plate	.147" to .149"
End Clearance	.005"
Replace at	.007"
Thrust Plate Capscrews	15 to 20 ft. lbs. torque

CARBURETOR

Marvel Schebler	TSV - 13
Type	Updraft
Throttle Flange	5/8" SAE
Venturi	7/16"
Float Level	1/4" from nearest edge of float to top of bowl
Idle Needle Adj.	approx. 1-7/8 turn open

CONNECTING ROD

Length	5-3/4"
Squirt Hole	1/16"
Piston Pin Oil Hole	5/32"
Capscrew & Shake Proof Lockwasher	5/16"
Side Play	.006" to .010"
Replace at	.014"
Shims	None used
Journal Size	1.499 to 1.500
Bearing Clearance	.0015" to .002"
Maximum-Replace	.004"
Undersize Bearings	.002" & .020"
Capscrew Torque	20 to 25 ft. lbs.

CRANKSHAFT

Main Bearings	
Dia. Journal	1.999 to 2.000
Clearance	.0015" to .002"
Maximum - Replace	.004"
Replace shaft if out of round or taper	.003"
End Thrust	Adjustable
Shims	.002" & .006"
End Clearance	.003" to .007"
Main Nut Torque	75 to 85 ft. lbs.
Pal Nut Torque	5 to 10 ft. lbs.
Undersize Bearings	.002" & .020"

CYLINDER BLOCK

Bore Size	
Top	2.376" - .001"
Bottom	2.3765" - .001"
Piston Clearance	.002"
Rebore at	.010" or more
Ridge - Remove if replacing Rings or bearings	

DISTRIBUTOR

Gear Backlash	.0015" to .003"
Maximum	.008"
Cam Angle	32°
Point Gap	.020'
Condensor	.18 to .23 Microfarads
Type	Battery distributor
Drive	Clockwise
Crank Pulley Timing Mark Advance	3
Advance - Automatic	12
Running Advance	15

GOVERNOR

Needle Bearing	21 rol
Pivot Ball	3/16
Spring - free length	2-7/3
Speed Range	500 to 2100 R.P.I

LUBRICATION

Type	Pressu
Pump	Gear ty
Pressure	7 to 20 l
Capacity	3-1/2 q
Filter	own-cotton wa
Oil	SAE 10W to SAE (according to load & temperatu

OIL PUMP

Gear Backlash	.001" to .002"
Maximum Gear Backlash	.005"
Tooth Tip to Body	.004"
Gear end clearance	.004"
Drive Shaft Clearance in bushing	.002" to .0035"
Drive Shaft Clearance in bushing maximum	.006"
Driven Gear Shaft in body	.001" loose to .001" press
Driven Gear Shaft in block	.0005" to .0025" loose
Oil Pump to block gasket	Treated paper
Oil Pump cover to body gasket - lead	.007" thick
Capacity	7-1/2 qt. per min.
Pressure	
Minimum	7 lbs.
Maximum	20 lbs.
Spring (relief valve)	painted green
Length (free)	1-15/16"

PISTON

Cast Iron

Bosses releived at End of pin	Releived .002"
Tapers Out	1/2" above skirt end
Tapers Out	45° each side of pin
Piston	True Round
Sizes	.0035", .020", .040"
Dimensions	
Top	2.362" to 2.364"
Skirt	2.3735" to 2.3750"
Height	2-9/32"

Aluminum

Cam Ground	
Sizes	.0035",.020", .040"
Dimensions	
Top	2.362" to 2.364"
Skirt	2.3735" to 2.3750"
Height	2-9/32"

PISTON PIN

Diameter	.5433" to .5435"
Oversizes furnished	.003" and .005"
Fit in Piston	Light push fit
Fit in Rod	Very light push fit
Replace	.0003" loose or noisy

PISTON RINGS

Number used	3 per piston
Type - Production	
Compression (2)	Tapered
Pit Mark	Indicates top
Oil Control (1)	Ventilated
Standard Size Service	
Top Compression not tapered	Chromium Plated
Second Compression tapered	Expander used
Oil Control	Expander used
Clearance	
End Gap	.007" to .012"
Ring Land Clearance	.0015" to .0035"
Replace at	.0045"

Replace rings when gap increases above .012", plus three times the bore wear.

Oversize Rings	.020" & .040"

Not to be used until block is rebored

SPARK PLUGS

A.C. 45 or autolite AN7

Size	14 M.M.
Point Gap	.025"

VALVES

Intake Tappet Clearance	.012" cold
Roto Exh. Tappet Clearance	.012" cold
Timing	Marked gear
Inlet Opens	T.D.C.
Inlet Closes	35° after B.D.C.
Exhaust opens	40° before B.D.C.
Exhaust closes	T.D.C.
Seat Angle	45°
Seat Diameter	57/64"
Maximum Seat Width	1/16"
Intake Stem to Guide Clearance	.0018"
Replace at	.005" Maximum
Exhaust Stem to Guide Clearance	.0035"
Replace at	.007" Maximum
Pilot Size	5/16"
Guide Length	1-21/32"
Location	25/32" from top of block to top of guide
Service Guides	factory reamed to size
Valve Springs	free length 1-13/16"
Replace if less than	1-3/4"

CHASSIS SPECIFICATIONS

BELT PULLEY — Optional Equipment

Location	Left Side
Speed	1950 at 1800 of engine
Ratio Pulley to Engine	1.08 to 1
High Idle	2275 R.P.M.
Size	6" dia. 4" face

BRAKES — Internal expanding

Diameter	7"

CLUTCH

Type	Dry Plate
Size	6-1/2" dia.
Springs - free length	1-9/16"

COOLING SYSTEM

Type	Thermo Syphon

CROP CLEARANCE

Under Rear Axle	17-3/8"
Under Drawbar	13"

ELECTRICAL EQUIPMENT

Battery	6 volt 70 ampere hr.
Generator (Delco-Remy)	2 charging rates
High Rate	approximately 13 amp.
Low Rate	approximately 3 amp.
Starter (Delco-Remy)	6 volt

FAN

Type	Suction
Size	12" dia.
Blades	4
Fan Speed at 1800 engine R.P.M.	2900 R.P.M.
Ratio-Crankshaft to fan pulley	1 to 1.616

FRONT AXLE

Castor	None
Camber	5 degrees
Steering	Semi-Reversible
Toe In	None

FUEL SYSTEM

Type feed	Gravity
Fuel	Gasoline only
Tank Capacity	5 gal.
Carburetor	Updraft
Float Level	1/4" from nearest edge of float to top of bowl
Fuel Filter	Felt & Bowl

GENERAL DIMENSIONS

Tires

Front	4:00 x 12
Rear	6 x 30

Tire Pressure

Front	15 lb.
Rear	12 lb.

Wheel Spacing

Front	36" to 64"
Rear	36" to 64"

Wheel Base	68"
Length - Overall	116"
Height - Top of Steering Wheel	56"

POWER

Drawbar	8:00 H.P.
Belt	10.5 H.P.
Recommended Load	1 - 12" plow

RADIATOR

Type	Pressure - Tubular
Operating Pressure	7 lbs.
Capacity	6-1/2 qt.

TRANSMISSION

Speeds

Low (Special - Optional)	1.6 M.P.H.
First	2.26 M.P.H.
Second	3.57 M.P.H.
Third	6.91 M.P.H.
Reverse	1.96 M.P.H.

Lubricant Capacity	6 qt.

TURNING RADIUS

With Brake	6-1/2 ft.
Without Brake	8-1/2 ft.

WEIGHT — 1400 lbs.

ENGINE HOOD AND HOOD SUPPORT

Removal

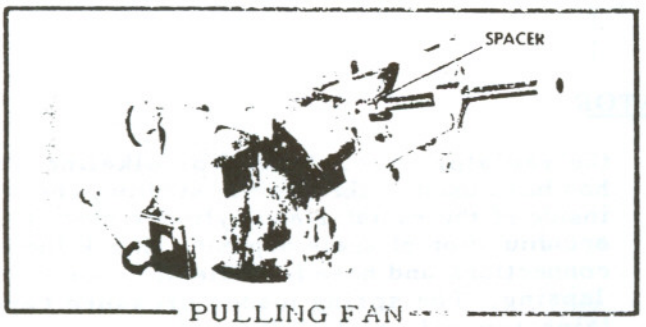
The hood and hood support may be removed together if the capscrews attaching the hood to the radiator are removed and the two short capscrews, spacers, the one long capscrew and spacer are removed from the lower portion of the hood support at the crank end of the engine. Remove the tail light from the hood support.

If the hood alone is to be removed, the bolts must be removed from the hood at the top of the hood support.

FAN ASSEMBLY

Removal

Loosen the generator and move it toward engine in order to remove tension from the fan belt. Remove the air cleaner and the instrument box from the fan shaft bracket. Remove the carburetor air inlet pipe and bracket from the cylinder head. Remove the four nuts attaching the fan shaft brackets to the cylinder head.



PULLING FAN

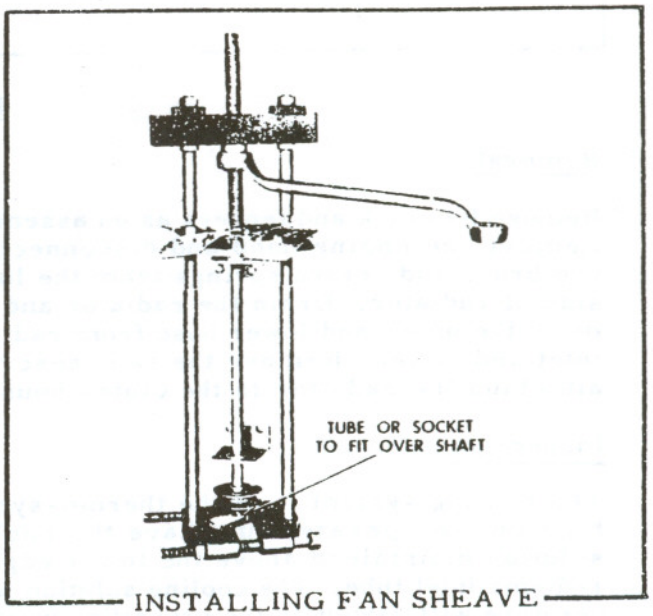
To remove the fan from the shaft, it is necessary to remove the fan bracket from the bearings and attach the OTC puller as shown using a 1/2" x 2" spacer equipped with a 60° center between the puller screw and the fan shaft.

PULLING FAN SHEAVE

The pulley may be removed from the shaft with the same tool. This work may be done more satisfactorily if a press is available.

Inspection

Inspection of the fan may be accomplished without removing it from the engine. Check the bearings for wear and roughness. They should not be rough or worn more than .006". Check the fan belt sheave contact surface for wear caused by the fan belt. If the wear indicates that the surfaces are curved or that the belt bottoms in the sheave, the sheave should be replaced. The fan shaft should be straight. Check fan blades for loose rivets or cracks.

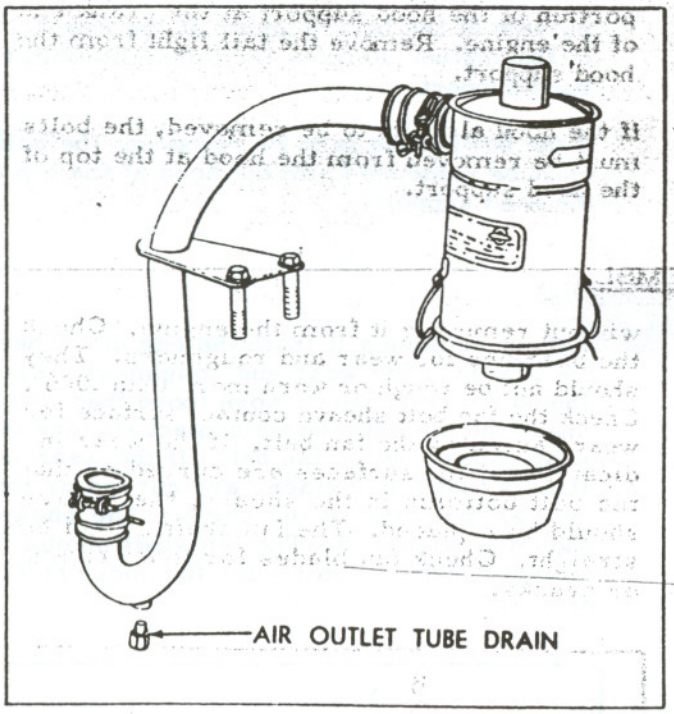


INSTALLING FAN SHEAVE

Assembly

Press the front bearing, bearing spacer and fan sheave on the shaft until the sheave is flush with the end of the shaft. Place the front fan shaft bracket on the bearing and install the snap ring. Press the rear bearings and brackets and fan blade assembly on the shaft until the bearing brackets measure exactly 11-1/4" center to center between the bearing bracket attaching holes. This method must be followed in order that the fan sheaves will line up with the generator and crankshaft sheaves and to make sure that the bearing bracket centers will fit the cylinder head studs of the engine.

AIR CLEANER



Removal

Loosen the hose connections at each end of the carburetor air inlet pipe and remove the two nuts attaching the air inlet pipe support to the cylinder head. Remove the bolts attaching the air cleaner body to the rear fan bracket.

Inspection

Check the air inlet pipe, air outlet tube drain filter and air cleaner for leaks. Any leaks in air cleaner body or between body and carburetor will defeat the purpose of the air cleaner. Check the drain hole at the lower end of the carburetor air inlet pipe and make sure the strainer is in place. If missing or loose, it should be replaced. Backwash the filter element, making sure that all foreign material is removed from the element and the inlet side of the air cleaner body.

RADIATOR

Removal

Remove fuel tank and fenders as an assembly. Remove the engine hood and disconnect the two brake rod return springs from the lower side of radiator. Drain the radiator and remove the upper and lower hose from radiator inlet and outlet. Remove the two capscrews attaching the radiator to the clutch housing.

Inspection

The cooling system is of the thermo-syphon type and to operate must have the cooling solution maintained above the lower edge of radiator inlet tube. The cooling solution temperature will vary with the prevailing weather temperature and will be hottest on the days when the outside temperature is hottest. This system is automatic and the speed of circulation varies with the difference between temperature of the radiator and the water jacket of the engine. The engine will operate at a temperature even in the coldest weather, which tends to prevent the formation of condensation in the crankcase. If the engine should overheat, check the fan belt for slippage. Check the radiator for leaks and accumulation of foreign material in the radiator core. If hard or alkaline water has been used in the cooling systme, check the inside of the radiator and cylinder block for an accumulation of scale deposit. Check the hose connections and hose for deterioration or collapsing. The spring loaded pressure cap retains approximately 7 lbs. of pressure in the cooling system and raises the boiling point to approximately 230° Fahrenheit. The pressure cap also incorporates a vacuum valve which is set at 1-1/2 ounces to relieve the system of vacuum when it is cooling off. When draining the cooling system, it is best to loosen the radiator cap so the system will not become air-bound, which might prevent draining. CAUTION: Do not remove the radiator cap if the engine is overheated. Remove cap after engine has cooled.

Assembly

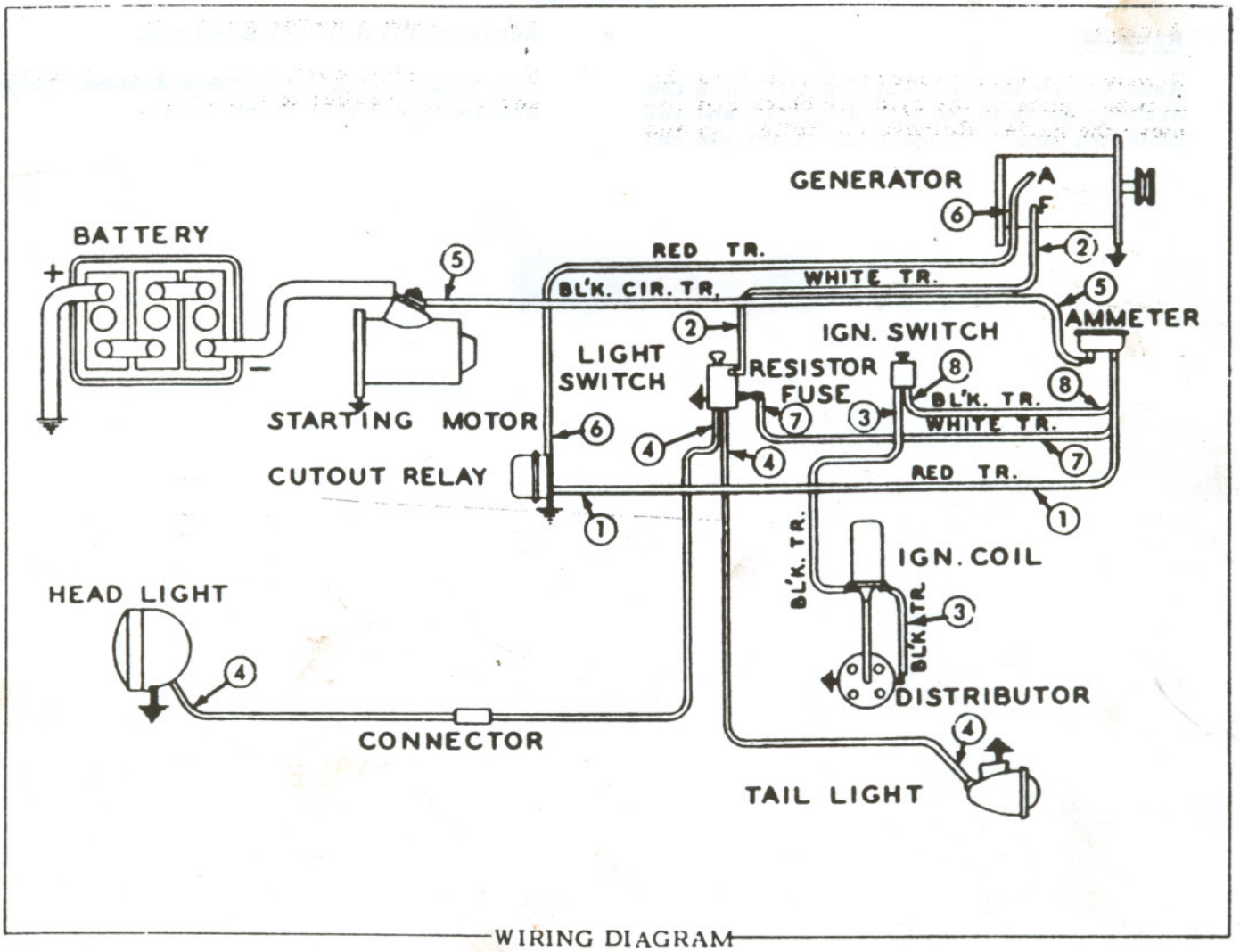
Install the radiator on the tractor using a sealing compound at the hose connections to prevent leaks. Due to the higher operating temperature of the thermo-syphon system, it is not advisable to use alcohol as an anti-freeze. Ethylene-Clycol or some similar solution should be used as an anti-freeze.

DRAWBAR

Removal

Remove the four capscrews attaching the drawbar guide to the cylinder block and remove the guide. Remove the cotter pin and nut from the drawbar pivot pin.

For engine removal, remove drawbar guide and swing drawbar to one side.



WIRING DIAGRAM

#1 - Discharge side of ammeter to cutout.
#2 - Resistor to generator field terminal.
#3 - Ignition switch to coil to primary distributor lead.
#4 - Light switch to headlight & tail light.
#5 - Change side of ammeter to starter.
#6 - Generator armature terminal to cutout relay.
#7 - Discharge side of ammeter to fuse.
#8 - Discharge side of ammeter to ignition switch.

When any service is to be performed on the electrical system, the battery ground strap should be removed. Removal of the battery ground strap will prevent shorting and damage to ammeter or any of the relative parts of the entire electrical system.

LIGHT SWITCH

The light switch is mounted on the instrument panel which is located under the engine hood and is attached to the front fan bracket. The light switch incorporates the generator control, which is of the two step system, having a high and low charging rate. The fuse for the lighting system is also mounted on the light switch. A fuse of either a 10 or 15 amp. capacity can be used. The operation of the light switch is as follows: When the switch is all the way in, the lights are off and the generator charge rate is at the low position. With the light switch pulled out to the first stop the lights are on and the charging rate is in the high position. With the light switch pulled all of the way out, the lights are off and the charging rate of the generator is in the maximum position. This manual control of the charging rate is accomplished by a resistance unit on the outside of the light switch

which is cut into or out of the circuit and limits the amount of electrical current allowed to pass through the field coils of the generator. The generator charging rate is approximately 3 amperes in low position and 13 amperes in high position.

IGNITION SWITCH

The ignition switch is also mounted on the instrument panel and is used to complete the ignition circuit.

AMMETER

The ammeter is mounted on the instrument panel and indicates the rate of generator charge or battery discharge to the electrical system.

Inspection

Inspect all wires and make sure they are free from cracks, broken wires or terminals and free from deterioration. They should also be kept free of grease and dirt accumulation All grommets should be in place and in good condition.

Assembly

See the wiring diagram for the connections which must be made to complete the wiring system. Keep all connections clean, bright and tight.

HEADLIGHT AND TAIL LIGHT

Removal

The headlight is mounted on the front frame of the tractor and may be removed if the headlight wire is disconnected at the front frame. If the wire is to be removed from the torque tube, it is advisable to place an extension on the wire that may be left in torque tube when the light wire is drawn out. With this extra extension it is possible to replace the head light wire without any difficulty.

The tail light is mounted on the hood support and the wire is connected directly to the light switch.

Both lights use single contact 6 - 8 volt bulbs. The headlight is 32 candle power and the taillight is 15 candle power. With the single contact bulbs, it is necessary to have all the lamps and tractor parts which are used to complete the circuit, clean, bright and tight. Dull reflectors cause inefficient lighting. The reflectors should be replaced if dull or polished by the use of lamp black or silver polish. In polishing the reflector, use a soft cloth that will not scratch the reflector. Always use a new gasket between the lamp and reflector to prevent any moisture from accumulating on the reflector surface.

GENERATOR

Removal

Remove the capscrew from the generator brace and the wires from the field terminal and ammeter or cutout terminals of the generator. Remove the two bolts from the lower pivot point or the two nuts attaching the generator mounting bracket to the cylinder block.

Inspection

Refer to the general section of the Service Manual for details on the generator. The generator should be repaired only by an authorized service station.

The generator is driven by the fan belt. To adjust tension, loosen clamp screw and move generator away from cylinder block. See "fan belt".

STARTER

Removal

Disconnect the battery ground strap. Remove the starter pull rod, the starter cable and ammeter wire from the starter switch. Remove the two capscrews attaching the starter to the clutch housing.

Inspection

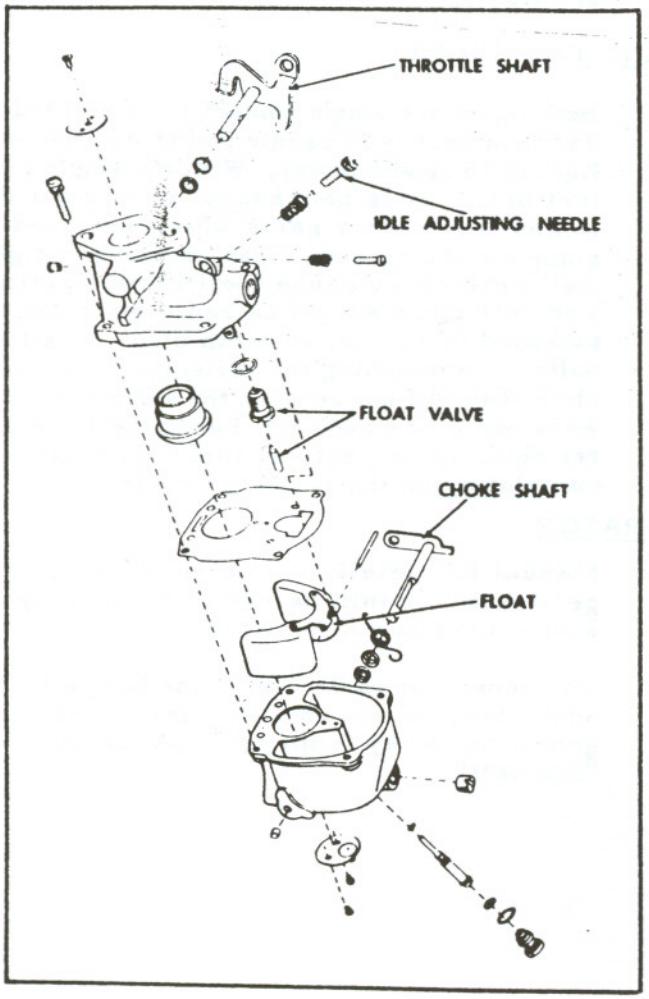
See the general section of the service manual for details on the starter. The starter should be repaired only by an authorized service station.

Check the battery terminals for cleanliness and tightness. All connections must be clean and tight.

In cold weather if the starter does not engage the flywheel promptly, the starter drive screw threads should be washed out with kerosene. Do not lubricate the starter drive threads but leave the kerosene as the only lubricant.

When reinstalling battery cable, place it under radiator and not around side of radiator.

CARBURETOR



The carburetor is a Marvel-Schebler TSV-13. The jet sizes are not marked on the jets of this carburetor and reference must be made to part numbers to be sure the correct parts are obtained.

Removal

Remove the carburetor air inlet pipe, the choke rod and the fuel line. Disconnect the carburetor link rod to the governor. Remove the two capscrews attaching the carburetor to the intake manifold.

Inspection

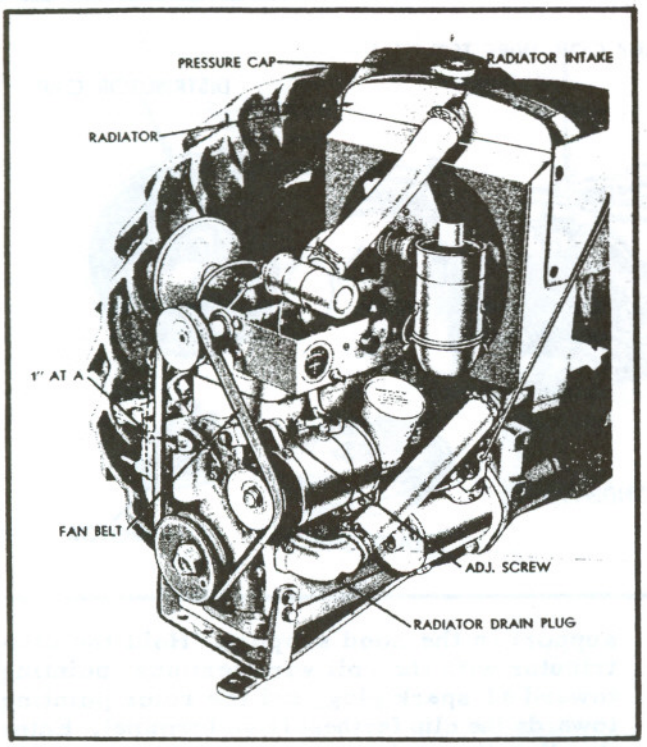
Inspect the choke shaft and throttle shaft for wear in the body. Any wear at these points will allow the entrance of dirt to the engine and cause uneven operation at low speeds. Check the float and the float valve for leakage. Check filter in intake pipe for loose felt through which dirt might enter.

Assembly

The float level should be set with the float 1/4" from the top edge of the bowl or 1/4" between the bowl gasket and the nearest edge of the float. The idle needle is set approximately 1-7/8 turns open. The float may be set by bending very near the float axis, being sure not to cause the float to strike the edges of the bowl.

With the engine heated to normal operating temperature, the idle stop screws should be adjusted to permit the engine to operate at approximately 500 r.p.m. at low idle.

FAN BELT



Removal

Loosen the generator brace and move the generator closer to the cylinder block. Remove the upper right capscrew and spacer attaching the hood support to the cylinder block.

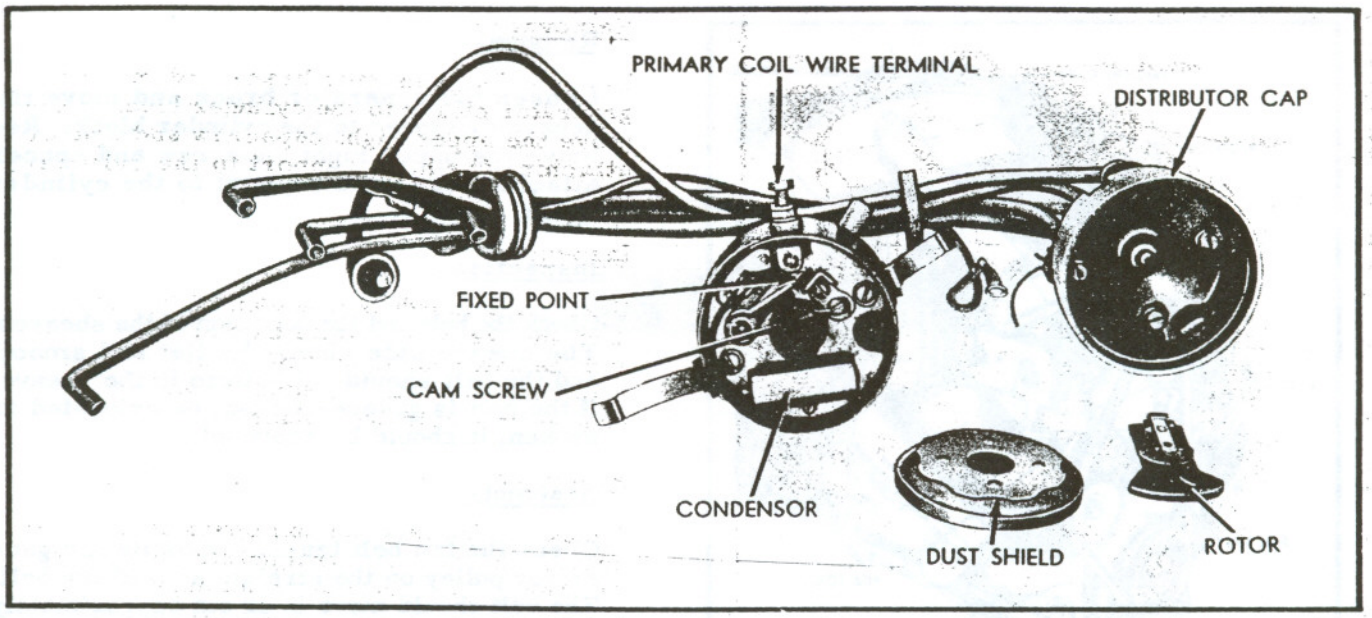
Inspection

Check the belt and the condition of the sheaves. The sheave side should be flat and smooth and the belt should not bottom in the sheave. If the belt is grease-soaked, deteriorated or broken, it should be replaced.

Assembly

Check the fan belt tension opposite the generator pulley on the straight side of the belt. The belt should move in or out approximately one-half inch from the straight line. Insufficient tension causes belt slippage or excessive tension places an overload on the front fan shaft bearing or the generator bearings.

DISTRIBUTOR



Removal

Remove the spark plug wires and coil wire wire from the top of the distributor. Disconnect the primary coil wire from the coil to the side of the distributor. Loosen the clamp screw at the base of the distributor and pull distributor up out of engine.

Inspection

Check the breaker points for pitting or wear.

Assembly

To set the breaker point gap the distributor rotor and the dust shield must be removed from the distributor. Turn the distributor until the points are separated to their widest position.

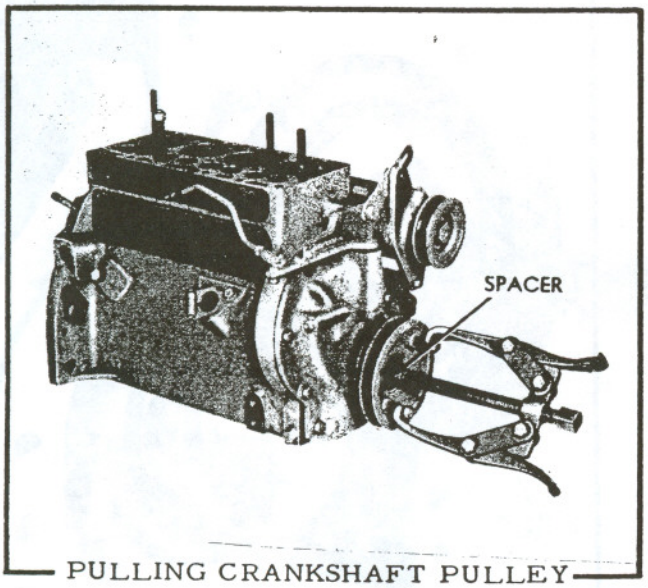
Loosen the lock screw on the fixed point and turn the cam screw until the points are separated .020". Tighten lock screw and recheck point adjustment.

To time the engine, turn the engine until No. 1 cylinder is at top dead center on its compression stroke and the timing mark on the fan pulley is located in the center of the timing inspection opening directly below crank support in the hood support. Hold the distributor with the coil wire terminal pointing toward #1 spark plug, and the rotor pointing towards the clip farthest from terminal. Enter the distributor into the engine block in this position. As the distributor enters the block and the gears mesh, the rotor will turn slightly in a counter clockwise direction. Clamp the distributor in place partially and turn the distributor body in a counter clockwise direction until the points just start to open. Clamp the distributor body securely in this position. This will place vent in dust shield down for proper drainage. Place No. 1 spark plug wire directly above the rotor and then proceed around the distributor in a clockwise direction placing 3, 4, 2 spark plug wires. Place the high tension coil wire in the center outlet of the distributor cap. Attach the battery lead wire from the coil terminal to the terminal on the side of the distributor body.

Use a good grade of rubber cement or shellac on the rubber nipples on the distributor to spark plug wires and high tension coil lead.

The distributor is a Delco-Remy model #1111708 and all repair parts and service should be obtained from United Motors Service.

TIMING GEAR COVER



PULLING CRANKSHAFT PULLEY

Removal

Remove the hood and hood support. Disconnect the carburetor link rod and the governor spring. Remove crank jaw. Use two 3/8" capscrews and pull crankshaft pulley as shown. Do not run capscrew through against die cast cover or pry against cover as it may be easily damaged.

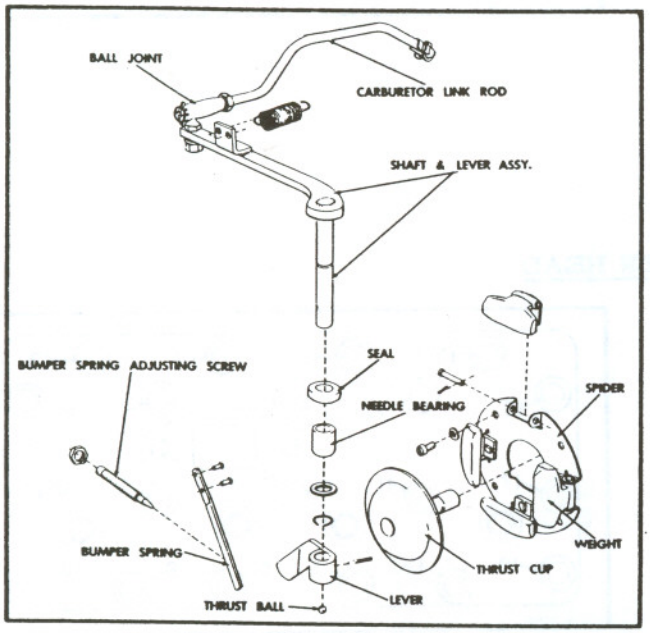
Inspection

See "governor" and oil seals.

Assembly

Tighten capscrews to 15 ft. lbs. torque.

GOVERNOR & GOVERNOR WEIGHT ASSEMBLY



Removal

Remove the hood and hood support and the fan belt. Pull the crankshaft fan drive sheave. Disconnect the carburetor throttle link rod from the carburetor and the governor spring from the governor arm. Remove the timing gear cover from the engine.

Remove the snap ring from the governor shaft and turn the shaft until the tapered groove pin can be driven out of the governor arm. The shaft and lever assembly can be pulled from the timing gear cover. A 3/16" thrust pivot ball is used under shaft. The needle bearing may be driven from the cover.

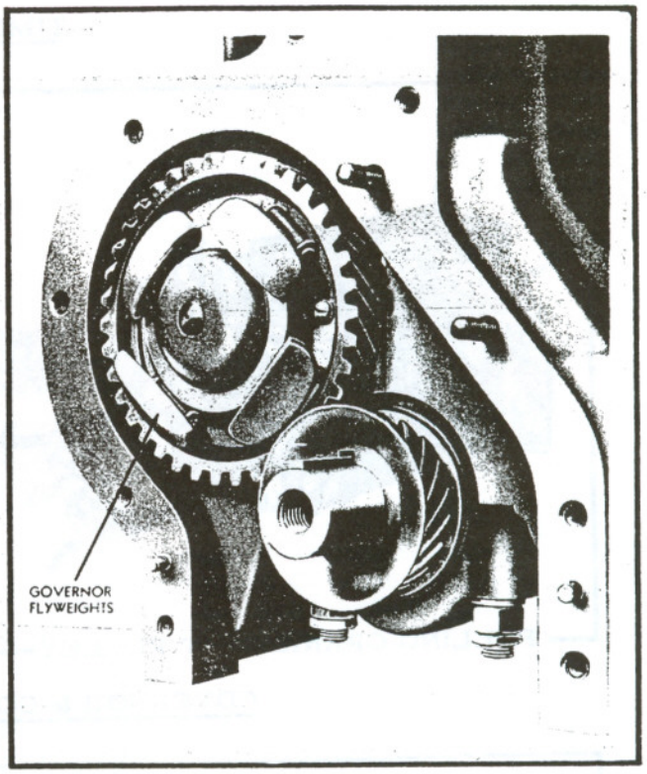
Assembly

If the needle bearing has been removed, it should be replaced with a new part and pressed into place. Install the lever and shaft assembly in the timing gear cover using a new dust seal. Be sure pivot ball is in position. At any time when the timing gear cover is removed a new crankshaft oil seal must be used. Tighten the timing gear cover capscrew to 15 ft. lbs. torque.

To adjust the governor, back out the governor bumper spring adjusting screw entirely. Place the throttle lever in the full speed position and hold the carburetor in the full speed position. Adjust the carburetor link rod until it just fits between the governor arm and the carburetor. Adjust the ball joint at the end of the carburetor throttle link rod until it is free of all slack but not tight. The throttle rod is provided with a stop to keep the engine from being over speeded. Make sure this cotter pin stop is in place. Be sure that the throttle rod has not been bent at the spring end which would cause interference with the spring.

The governor bumper spring adjusting screw is provided to eliminate surge from governor. It is usually not necessary to use this screw - however, if the engine does surge

the screw should be turned in slowly until surging is overcome. If the surge screw is turned in too deeply, it will increase the r.p.m. at which governor action takes place. This increase would be from low idle to a maximum of 700 r.p.m.



Governor Weight Assembly

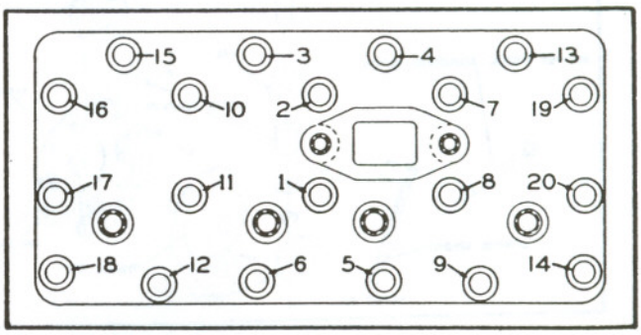
Removal

Remove the timing gear cover and the governor thrust cup assembly. Remove the governor spider and weight assembly from the timing gear.

Inspection

The governor thrust cup assembly fits the camshaft with from .002" to .004" clearance. It should be replaced if this clearance exceeds .008" or if the cup is worn at the weight riser contact surface. Check the vent hole in the camshaft behind the thrust cup shaft and be sure it is clean and free of any foreign material. If this hole becomes plugged, the governor will be inoperative due to the vacuum created behind the thrust cup shaft. Check the governor weight for wear on the riser and any wear at the hinge points. The assembly should be replaced if the hinge pins are worn more than .006"

CYLINDER HEAD



Removal

Remove the hood and hood support, carburetor air inlet tube, air cleaner, instrument panel, spark plug wire grommet holder and fan assembly. Drain the radiator and remove the upper hose. Remove the balance of the studs and nuts from the cylinder head.

Inspection

Clean the carbon from the cylinder head and check the head for leaks or cracks and scale accumulation.

Assembly

Install the head using a new gasket. Tighten the stud to 55' pounds torsion following the chart.

OIL SUMP

Removal

Remove the drawbar guide and swing the drawbar to one side. Drain the oil sump and remove the small cover over the lower portion of the clutch housing. Remove the capscrews attaching the oil sump to the cylinder block.

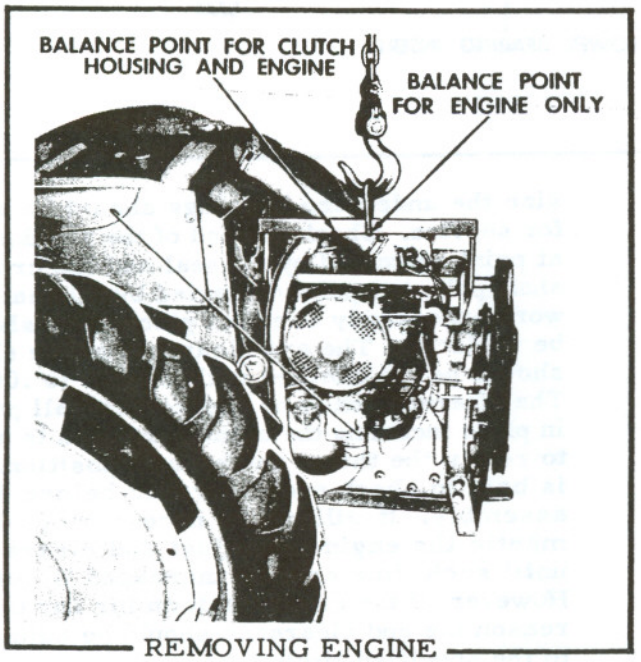
Inspection

Clean the oil sump and pump screen thoroughly and inspect the screen for broken mesh

Assembly

Use a sealer on the one side of the gasket surface only. Tighten the end capscrews which enter the die cast timing gear cover and rear oil seals to 15 foot pounds torque. To overtighten may strip threads from die casting. Refill sump with fresh oil.

ENGINE REMOVAL



REMOVING ENGINE

The complete engine may be removed as a unit as follows: Drain the cooling system and the oil sump and shut off the fuel supply. Remove the hood, hood support and radiator hoses. Remove the drawbar guide. Remove the starter and choke rods and the battery cable at the starter - also disconnect the headlight wire. The engine may be supported from the fan shaft bearings, however, do not hook in such manner as to pull bearing brackets closer together or to place a strain on shaft. It is best to use a solid bar as shown or a spreader must be placed between the chain ends close to the fan shaft bearing bracket. Disconnect the fuel line, remove throttle rod, remove the bolts from the clutch housing and swing engine away from tractor.

Clutch Housing and Engine Removal

The small housing and engine may be removed as a unit by following the engine removal procedure and removing the clutch pedal rod from the throwout bearing fork and unhooking the brake return springs at the bottom of the radiator support. The same lift arrangement can be used excepting the balance point for the engine and clutch housing is about 4" closer to the flywheel end of the engine. After attaching the engine to the chain hoist, remove the capscrews attaching the clutch housing to the transmission housing.

MANIFOLD

Removal

Remove the carburetor air inlet tube. Disconnect the fuel line and governor link rod and governor spring. Remove the throttle rod guide. Remove the nuts attaching the manifold to the cylinder block.

Inspection

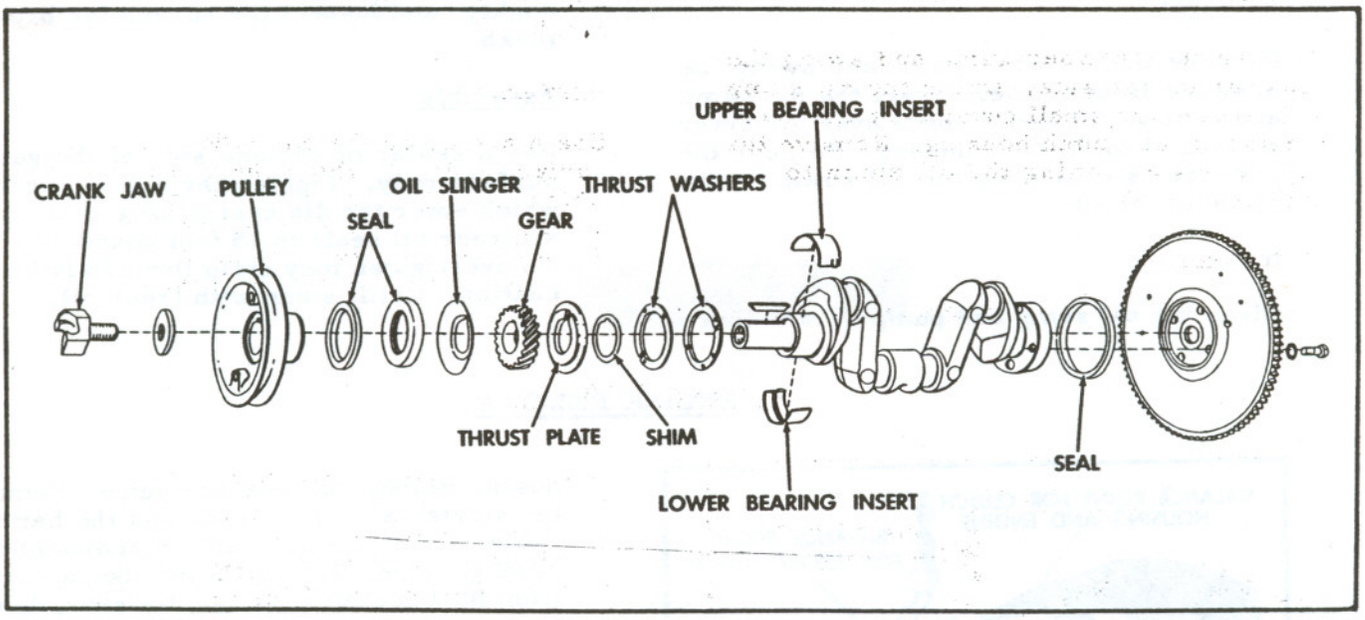
Check the manifold for carbon accumulation. A partially plugged manifold will cause rapid loss of power. Check the manifold for leaks or cracks. Always use new gaskets.

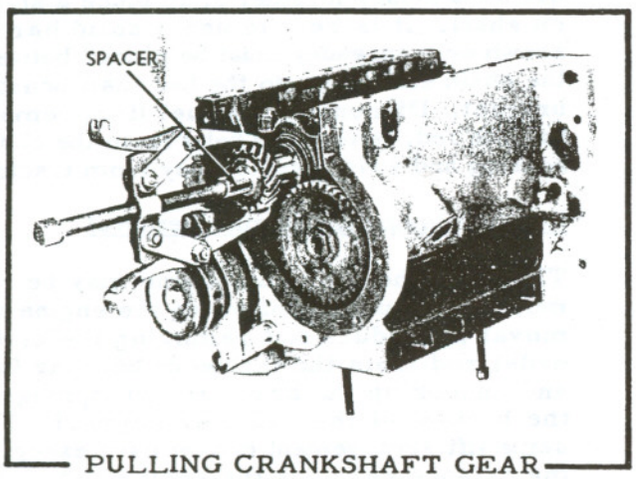
Assembly

Install manifold and tighten nuts to 20 to 25 ft. lbs. torque.

Install the pin in the throttle rod ahead of the throttle rod guide. This pin prevents the engine from being overspeeded.

The intake manifold vacuum is 18 to 19 inches at low idle when the engine is in good mechanical condition and properly adjusted.





PULLING CRANKSHAFT GEAR

Removal

Remove the engine from the tractor. Remove the clutch and flywheel. Remove the crankshaft fan pulley and the timing gear cover. The crankshaft pulley may be removed by using two capscrews and the OTC puller with a 1" x 1-1/2" spacer with a 60° center. Do not pry on die cast gear cover or turn capscrews in against cover. Remove the oil sump and the main bearing cap. Remove the connecting rod bearing caps.

Inspection

Check the crankshaft journals for wear, scoring and out-of-round. The shaft should be replaced if worn or out-of-round more than .003". .002" undersize bearing shells are provided for service. The bearings do not use shims, and if the shaft is worn undersize the undersize bearings should be used for service. Check the end of the crankshaft at point contacted by oil seal and the crankshaft pulley at point contacted by oil seal. If worn excessively at either place, they should be replaced. The end clearance of the shaft should be maintained within .003" to .007". The clearance must be checked with all parts in place including the crank jaw which is used to retain the thrust washers in position. It is best to check end clearance before disassembly. It will not be necessary to dismantle the engine to adjust end clearance until such time as it is increased to .011". However, if the engine is down for any other reason the end clearance should be adjusted to the specified limit.

Assembly

The main bearing inserts may be installed without removing crankshaft if a small pin is inserted in the crankshaft oil hole and the upper shell rotated out of place. The main bearing shell has an oil hole in the upper half and is solid on the lower half. The spurs on the shells to prevent turning in the block are diametrically opposite. The main bearing oil clearance should be from .0015" to .002" and should be adjusted if it reaches .004" or more. Do not file main bearing caps or inserts. Tighten the main bearing nuts to 70 to 80 foot pounds. Tighten pal nuts to 10 foot lbs.

Both thrust washers should be placed on the shaft with the bevel on the inside diameter towards the first crank throw of the shaft. The steel thrust plate goes against the bronze thrust washer with the large surface towards

the bronze washer. .002" and .008" shims are used between the steel thrust washer and the shoulder on the crankshaft to adjust the end clearance. Either the shaft must be removed to adjust end play or a special puller used to remove the crankshaft timing gear.

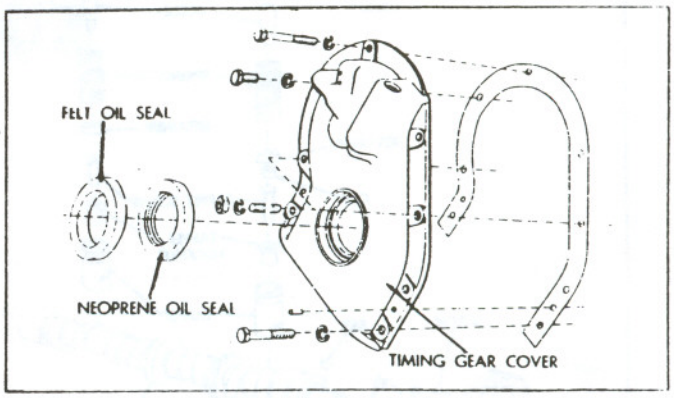
When installing the crankshaft, the crankshaft gear must be meshed with the camshaft gear according to the marks. There is one mark on the crank gear and two on the cam gear. Place the single mark between the double mark.

The main bearing caps are marked No. 1 and No. 2 and the block correspondingly and these marks should face the camshaft side of engine.

CRANKSHAFT OIL SEALS

The crankshaft seals are Neoprene seals, spring loaded. They must be installed with the lips toward the oil supply in the oil sump. The seals must be replaced each time the crankshaft is removed or the timing gear cover removed. The front seal has a felt seal installed on the outside of the Neoprene seal. Shellac the felt seal to the face of the Neoprene seal. When replacing seals, be careful not to damage the die cast retainer.

If difficulty is encountered with the seals seeping or leaking oil, check the surface of the crankshaft at the flywheel end contacted by the oil seal and the surface of the crankshaft fan pulley contacted by the front seal. If these diameters are worn too small for the seal to make a firm contact, the parts should be replaced. Be sure



the regular oil sump capscrews are used in the center hole of the rear oil seal retainer. If an extra long capscrew is used on this position, it will force the seal away from the retainer.

OIL PUMP

Removal

Remove the engine from the tractor and remove the clutch and flywheel. The pump is mounted at the rear of the engine block and is driven by the camshaft. The capscrews that attach the oil pump to the cylinder block also hold the pump assembly together.

Inspection

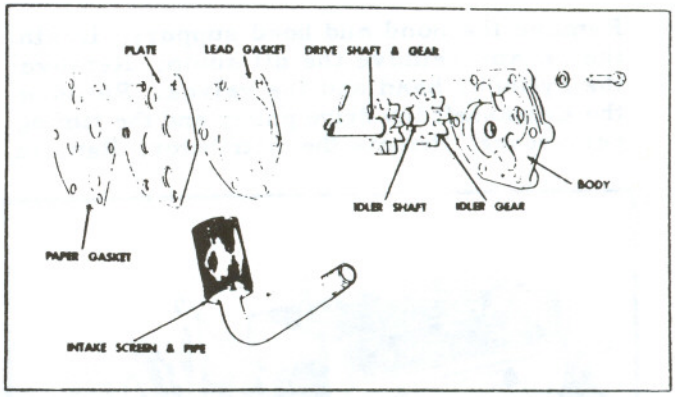
Check the pump for gear back lash, which should not be more than .005". The clearance between the tips of the teeth and the pump body should not exceed .004". The clearance between the gear and cover for the side clearance of gears should not exceed .004". The minimum permissable oil pressure is 7 pounds per sq. inch.

Later pumps have short idler shaft and no hold in plate.

The drive shaft clearance should not exceed .006". The desired clearance is from .002" to .003".

Assembly.

A .007" thick lead gasket is placed between the



body and the cover and the treated paper gasket is placed between the pump and cylinder block.

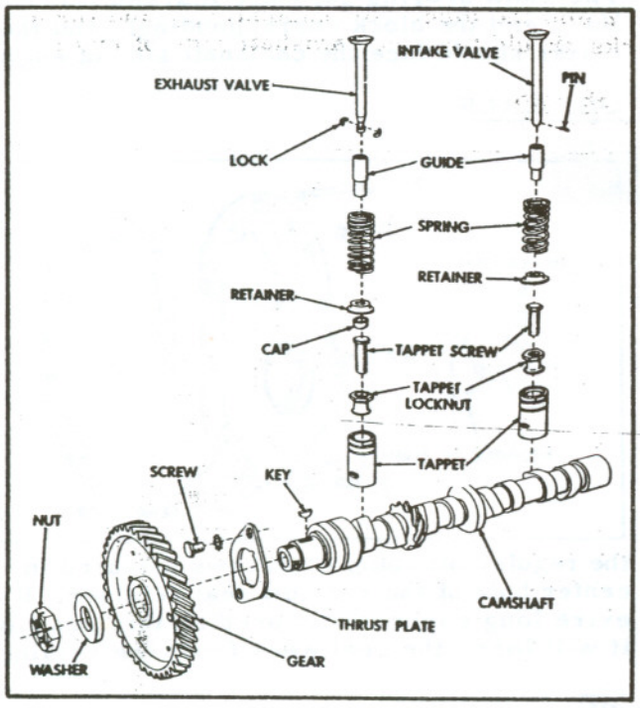
If oil pump strikes clutch housing it will cause gears to cut into pump body, shearing drive pin.

When repairing the pump, the oil screen and suction line to the pump should be checked and must be clear and free of leaks. The oil gallery in the cylinder block must be clean to 15 foot lbs. Use a sealer on paper gasket between body and block.

The desired oil pressure is 15 to 20 pounds

per square inch and can be obtained by adjustment of the oil pressure relief valve. Do not attempt to adjust low oil pressure by use of the pressure relief valve until all other sources of low oil pressure are investigated.

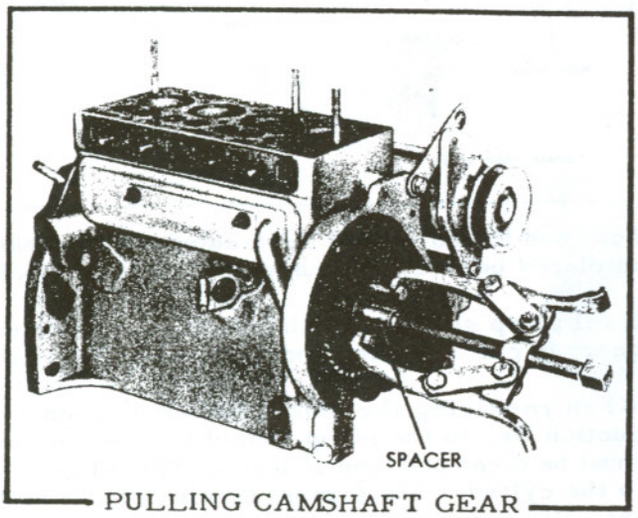
CAMSHAFT



Removal

Remove the hood and hood support. Drain the oil and remove the oil sump. Remove the cylinder head and the valves. Remove the crankshaft fan drive pulley and the timing gear cover. Remove the distributor. Remove the governor spider assembly and pull the camshaft timing gear. Remove the cam shaft thrust plate and pull the camshaft from the engine.

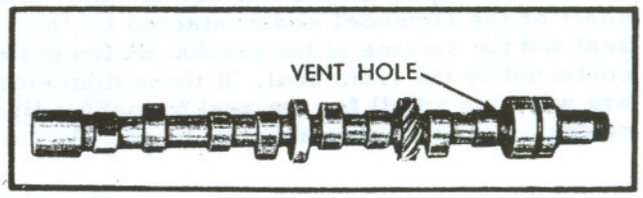
The cam followers or tappets may be removed from the valve compartment if the adjusting screws are removed.



PULLING CAMSHAFT GEAR

Inspection

The maximum clearance between the camshaft journal and the cylinder block should not be more than .007". Check the camshaft vent opening into the governor thrust cap shaft. If this hole is plugged, it will be impossible to obtain good governor action.



Check the opening between the center of the front cam journal and the oil hole leading to the thrust plate. Check the shaft journals, cam lobes and cam follower faces for wear or scoring. If scored, they should be replaced.

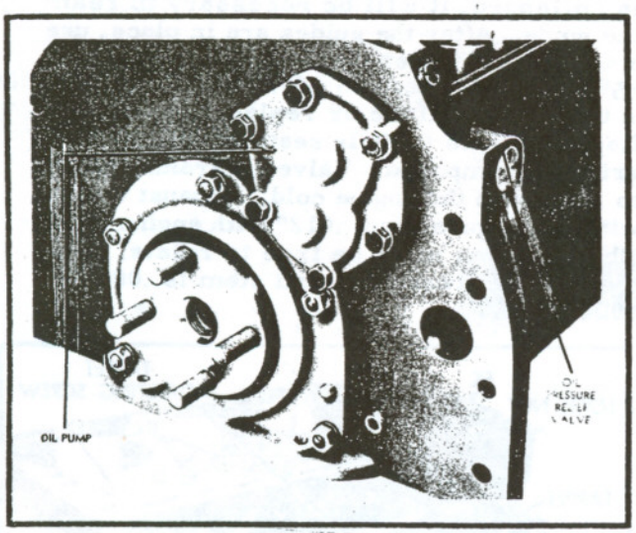
The back lash of the timing gear will not cause the engine to become inoperative, however, as clearance increases noise will also increase. Noise usually becomes objectionable as the back lash clearance approaches .020".

The end play of the camshaft should be approximately .005". If this clearance exceeds .007", a new thrust plate assembly should be used.

Assembly

When the camshaft is replaced or reinstalled, the valves must be timed. There is a single mark on the crankshaft gear and a double mark on the camshaft gear. The single mark must be placed between the double mark.

OIL PRESSURE RELIEF VALVE



Removal

The oil pressure relief valve is located on the flange of the cylinder block near the oil pump. It may be removed by use of a heavy duty screw driver. Beneath the plug is the spring and plunger assembly.

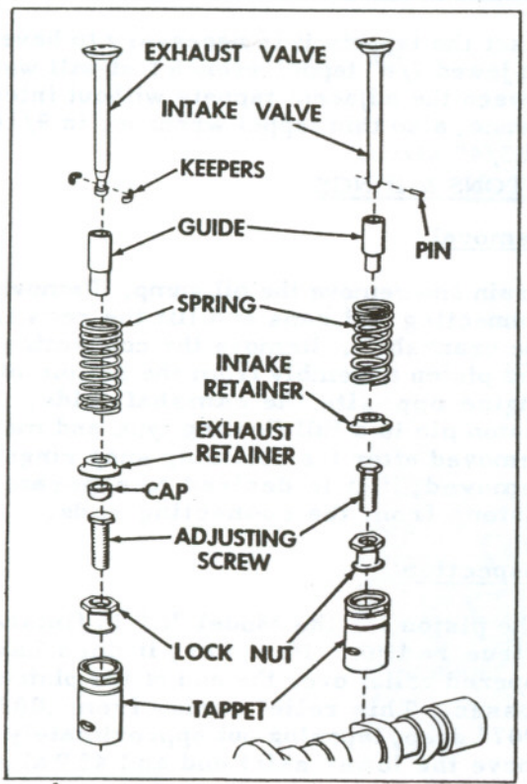
Inspection

Check the relief valve spring for its free length, which should be 2". The spring is painted red for identification. A neoprene seal is used on the plug to prevent leakage.

Assembly

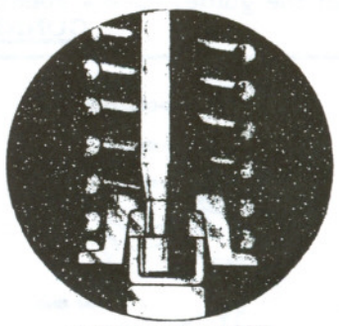
The oil pressure relief valve should not be used to increase the pressure of the system until all other sources of low oil pressure are investigated. The minimum allowable oil pressure 7 pounds. The desired operating pressure 15 to 20 pounds. The gauge is not calibrated in pounds, but the center of the indicator needle travel on the gauge face is approximately 15 pounds. The pressure may be regulated by placing washers between the spring and the retaining plug.

VALVES



Removal

Drain the cooling system and remove the cylinder head. Remove the distributor, the throttle rod and the carburetor and the valve cover. Use a valve lifter or spring compressor to remove the keepers from the valve stems. The valves may then be lifted out.



ROTO VALVE

The engine is equipped with roto caps on the exhaust valves. These caps provide a means of relieving the spring pressure from the valve when it is in the open position, allowing the valve to rotate on its seat. These caps increase valve life. Set exhaust valve clearance to .010" cold when equipped with roto caps.

The valve guides are removable and can be driven from the cylinder block if necessary. Always use a suitable driver.

driven from the cylinder block is necessary. Always use a suitable driver.

Inspection

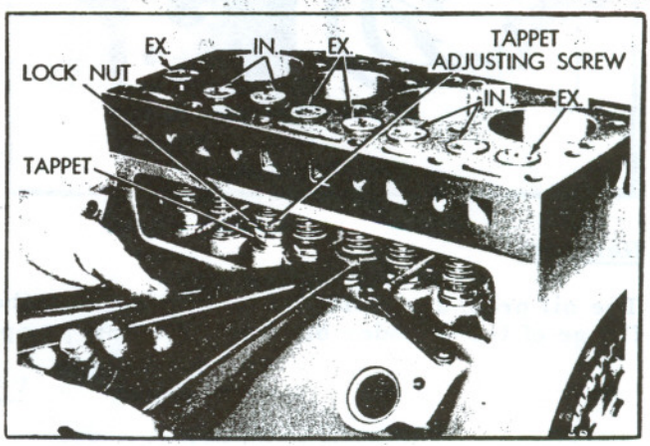
The valve face and seat angles are 45°. The seat width should be approximately 3/64" and not over 1/16". The intake valve stem clearance is .0018" and should be replaced if the combined clearance between the stem and guide exceeds .005". The exhaust valve stem clearance in the guide is .0035" and the maximum allowable clearance is .007" between the stem and the guide. Replace that part which is worn most or both, if necessary.

Service guides are reamed and ready for use and are all the same size. The difference in clearance between intake and exhaust valves is taken care of on the valve stem. A 5/16" diameter pilot is required for checking the guides. These pilots may be secured in .001" .002", .003" oversizes. The valve spring is cadmium plated and 1-13/16" long. The spring should be replaced if it is less than 1-3/4" long.

Install valve spring with closed end or 3 closed coils end towards cylinder block.

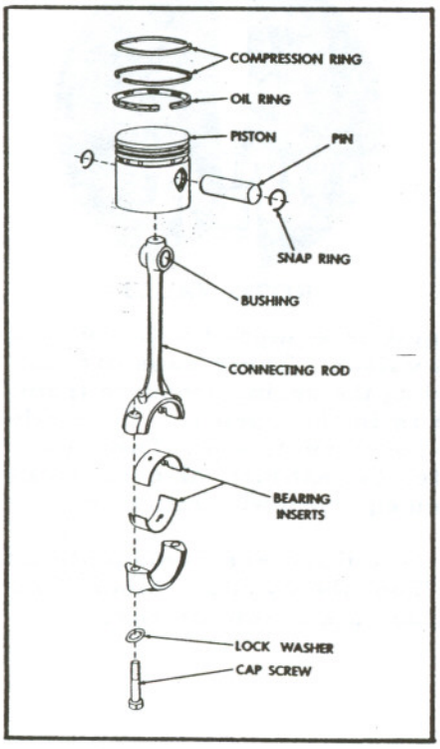
Assembly

The valve guide is 1-21/32" long and should be driven into the cylinder block until it is exactly 25/32" from the top face of the block to the top of the guide. Use a special driver in order to prevent distortion of the guide bore while driving in place. If the guide bore is collapsed, it will be necessary to ream the guide. After the guides are in place, use a 45° cutter to reseat the valve seat. Use 15° and 75° cutters to narrow the seat if it is too wide. Reface or replace the valves. Lap the valves to their seats with fine valve grinding compound. Valve clearance is set to .012" with the engine cold. Exhaust valves with roto caps are set .012" with engine cold. These valves must be free to rotate. The clearance between cap and stem is .004" to .006".



To set the tappets it is necessary to have a thin jawed 7/8" tappet wrench that will work between the adjacent tappets without interference, also thin tappet wrenches in 9/16" and 3/4" sizes.

CONNECTING RODS, PISTONS & RINGS



Removal

Drain and remove the oil sump. Remove the connecting rod caps and lift the rods from the crankshaft. Remove the connecting rod and piston assembly from the bottom of the engine opposite the camshaft side. The piston pin is a full floating type and may be removed after the retaining snap rings are removed, if it is desired to separate the pistons from the connecting rods.

Inspection

The piston for the Model "G" is finished to a true radius. However, it does have a tapered relief over the end of the piston pin bosses. This relief varies from .002" to .007" deep, tapering out approximately 1/2" above the lower skirt end and 45° at each side of the pin center line. This appears as a discolored triangular shape after the engine has been in use a short time.

The skirt diameter is 2.375" approximately. The skirt diameter and piston weight will be

marked on the piston top.

The aluminum piston used N62-3872 and above is cam ground. When fitting cam ground pistons use a .002" feeler strip 1/2" wide between the cam or tight side of cylinder wall. With feeler strip in place at tightest point, you should be able to move the piston by a slight push with thumb. If recommended clearance can not be obtained hone or rebore for next larger size piston. Minimum clearance is .001" to .002" between piston and cylinder wall.

The pistons are serviced in standard size .0035", .020" and .040" oversizes to provide pistons when reboring or honing is necessary.

The piston pin is fitted with a very light push fit in the connecting rod and a light push fit in the piston. They should be replaced when .0003" loose or when noisy.

The piston pin is supplied in .003" and .005" oversizes for repairs. The standard pin size is .5435. The production cylinder block is machined slightly tapered, being .0005" smaller at the top than at the bottom. The bore size is 2.377". The piston is fit with approximately .002" clearance. The maximum allowable cylinder wear is approximately .010".

The production ring gap is from .007" to .012". The ring side clearance in the piston ring groove is .0015" to .0035". Standard rings may be used for service until reboring is necessary - then .020" or .040" oversizes are available and the engine should be rebored to these standard sizes. The piston rings should be replaced if the side clearance exceeds .0045" or the end clearance exceeds .050". The cylinder wall should be refinished if the standard ring, when new, has .046" or more clearance.

The connecting rod has removable bearing inserts which should be replaced if the clearance exceeds .004". The crankshaft should be replaced if out of round more than .003". The side play of the connecting rod is from .006" to .010" and should be replaced if it exceeds .014".

The bearings are not provided with shims. The rod or cap should never be filed to obtain bearing adjustment.

Assembly

The compression rings of the tractors are tapered and have a small pit mark on the top side. The standard size service ring set will consist of a chromium plated top compression ring that will not be tapered and the second compression ring which will be tapered. All tapered rings will have a pit mark on the top side. The lower compression ring will be fitted with an expander. The oil control ring will also be supplied with an expander.

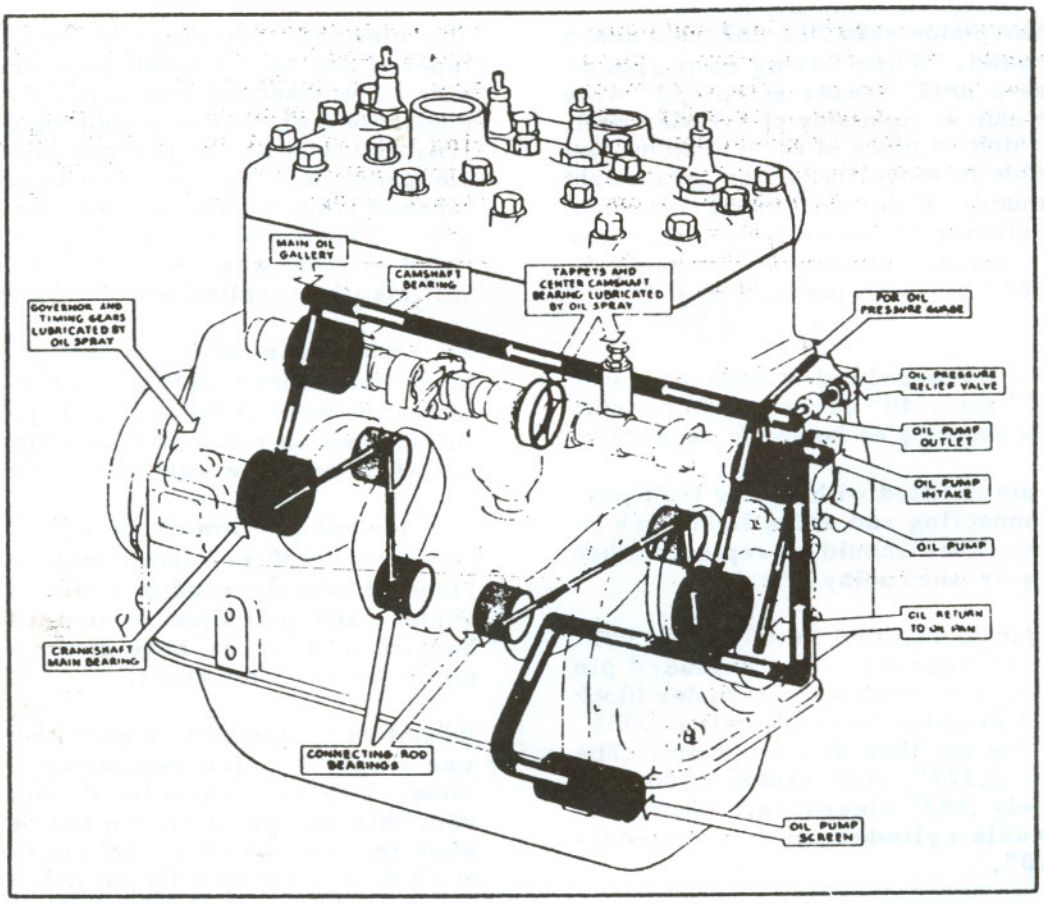
Fit each ring in the lower part of the cylinder block bore where piston ring travel stops or where the wear is the least. Try each ring in the groove on the piston in which it will be installed to make sure that it is free.

The lowest portion of the cylinder bore is chamfered 45° to permit installation of the rings without the need of a ring compressor. Pistons and rods must be installed from the bottom and on the side of the crankshaft opposite the camshaft.

When fitting standard or oversize piston pins use a spiral fluted expanding reamer or a hone. The bushing in the connecting rod is very thin and great care must be exercised when reaming. A very light cut must be used at all times. Be sure the oil hole in the bushing is in line with the oil hole in the top of the connecting rod. Clean the oil hole after reaming. The pin fits in the piston with a line to line fit and in the connecting rod with a .0003" loose fit. A good method of determining the type of fit is to use a light push fit in the piston and a very light push fit in the connecting rod.

The connecting rod as used in production is marked both on the rod and the cap on the camshaft side. If the standard bearing does not give the correct clearance on the crankshaft, .002" undersize bearings are available. The desired clearance on the connecting rod bearing is .0015" to .002". The spur on the bearing insert which prevents it from turning in the rod is on opposite sides of the crankshaft when the rod is correctly assembled. The oil spray hole in large end of connecting rod should face the camshaft side. Tighten the connecting rod capscrews to 20 to 25 foot lbs. torque. Do not file the connecting rod, cap or insert to obtain bearing fit.

ENGINE OILING SYSTEM


MAIN OIL GALLERY
CAMSHAFT BEARING
TAPPETS AND CENTER CAMSHAFT BEARING LUBRICATED BY OIL SPRAY
GOVERNOR AND TIMING GEARS LUBRICATED BY OIL SPRAY
FOR OIL PRESSURE GAUGE
OIL PRESSURE RELIEF VALVE
OIL PUMP OUTLET
OIL PUMP INTAKE
OIL PUMP
OIL RETURN TO OIL PAN
CRANKSHAFT MAIN BEARING
CONNECTING ROD BEARINGS
OIL PUMP SCREEN

The Model "G" engine uses regular grade lubricating oil of the following specifications:

For heavy duty service above 32°F use SAE 30.
For normal duty operation above 32°F use SAE 20.
For temperatures between 0°F and 32°F use SAE 20.
Below 0°F use SAE 10W.

Heavy duty operation is any operation in which the engine is called upon to produce half or more of its rated horsepower. Normal duty operation is interpreted as an operation in which the engine is called upon to produce an average of less than half of its rated horsepower.

New or reconditioned engines should use SAE 20 oil for the first fifty hours of operation and should be operated on light to medium loads if possible.

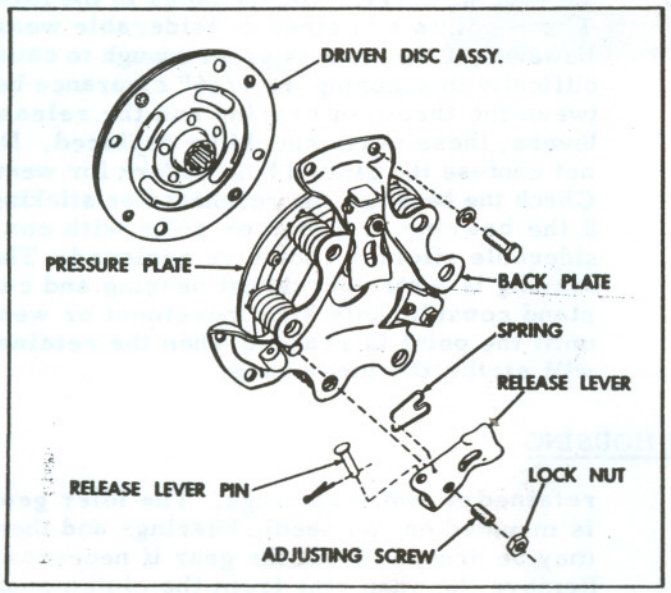
The oil sump capacity is 3-1/2 quarts with oil filter. For oil changes when the filter is not changed, 3 quarts will fill the sump to the required level. The oil filter should be replaced at least each 200 hours of operation.

The oil is drawn from the oil sump through the intake screen and pipe to the oil pump which is mounted at the rear of the camshaft and is driven at camshaft speed. The oil from the pump is forced under pressure into the oil gallery which is located in the cylinder block between the camshaft and the crankshaft. The oil pressure relief valve is located at the rear end of this gallery. The oil pressure relief valve prevents excessive pressure from being developed in the oiling system. Drilled passages are provided to lead the oil from the oil gallery to the front main bearing and the rear main bearing, and the front camshaft bearing. The drilled passage to the front camshaft is smaller than those to the crankshaft. The rear camshaft bearing receives its oil from seepage from oil pump. The differences in sizes of the drilled passages assures an adequate supply of oil to the main bearings. The center camshaft bearing, cam followers or tappets are lubricated from spray. Two port holes are provided into the valve chamber and the valve springs and stems are lubricated from spray entering this compartment through these two port holes. The front cam journal has a groove cut around its outside circumference and a hole drilled from this groove to the front side of the

journal. This hole lines up with the two notches cut in the camshaft thrust plate allowing two spurts of oil from each revolution to reach the thrust plate, the timing gear and the governor mechanism. Oil from the front main bearing is fed through the drilled crankshaft to No. 1 connecting rod journal and from No. 1 through another drilled passage to No. 2 connecting rod journal. Oil from the rear main bearing is fed to No. 4 connecting rod through a drilled passage and through a second drilled passage from No. 4 to No. 3 connecting rod.

Each connecting rod has a small squirt hole on the upper camshaft side of the large end which is used to increase the spray on the inside of the crankcase.

CLUTCH



Removal

Separate the engine from the clutch housing and remove the six capscrews attaching the clutch to the flywheel. Remove these capscrews evenly so that the spring tension will not distort the back plate as it is loosened from the flywheel.

Compress the pressure plates against the back plate by the use of three "C" clamps or by use of a press. Remove the pins from the release levers and release "C" clamps or press.

Inspection

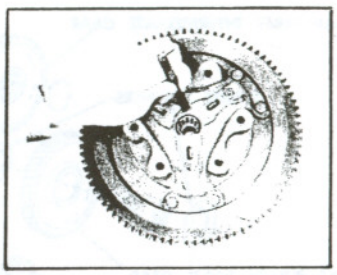
The clutch springs are 1-9/16" long and should be replaced if less than 1-1/2" long. It is preferable to replace clutch springs in full sets. Check the clutch lining for wear. It should be replaced if the lining thickness approaches the rivet heads. Check the lining and the hub for loose rivets. Check the hub for worn splines.

Check the face of the flywheel and the face of the pressure plate for flatness. These parts should not be warped.

Check the release lever for wear at the hinge pins and wear at the throwout bearing contact surface. Also check the adjusting screw and pivot or fulcrum points for wear.

Assembly

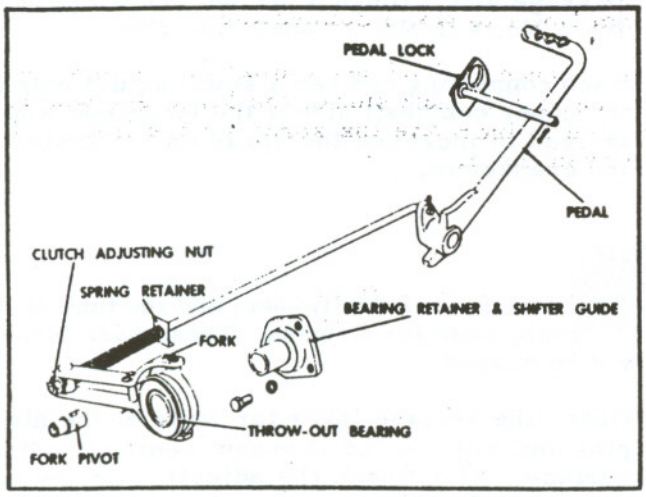
Assemble the plate to the flywheel with the long hub of the plate away from the flywheel. Use a pilot to hold the plate in alignment as the pressure plate assembly is attached to the flywheel. Lubricate the clutch shaft pilot bearing in the flywheel with chassis lubricant.



Adjust the clutch release levers until they are exactly 1-25/32" from the face of the flywheel, or 11/16" from the release lever contact surface to the back plate.

The throwout bearing should have 1/16" clearance between the bearing and the clutch release fingers. This measurement cannot be made when the tractor is assembled. This measurement can be related to clutch pedal travel, however, and is correct when the pedal has 1" of free travel. The clutch adjustment is made at the end of throwout fork by turning the nut on the end of the pedal rod. The pedal return spring is placed between the axle housing and the throwout fork. If a new clutch pedal is installed the upper stop should be filed until the pedal is approximately 4" below the seat attaching pad.

CLUTCH THROWOUT BEARINGS & FORK



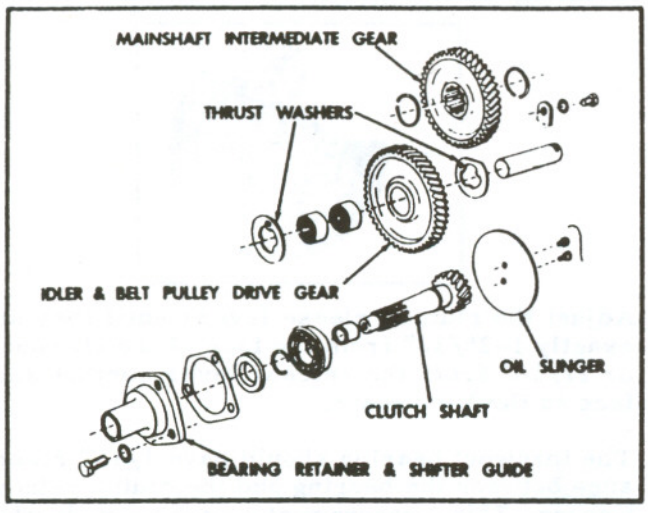
Removal

Separate the engine from the clutch housing and remove the pedal rod from the pedal. Remove the nut from the pedal rod and remove the rod and spring. Remove the hinge pin from the throwout fork. Remove the pin from the fork and remove the bearing assembly. The bearing may be pressed from the carrier.

Inspection

Check the fork pivot pin and the pin ends of the bearing carrier and the holes in the fork. These points can stand considerable wear; however, if the wear is great enough to cause difficulty in securing the 1/16" clearance between the throwout bearing and the release levers, these parts should be replaced. Do not confuse the slotted hole in fork for wear. Check the bearings for roughness or sticking. If the bearing is rough or rolls with considerable effort it should be replaced. The bearing is a straight thrust bearing and can stand considerable side movement or wear until the point is reached when the retainer will strike the inner race.

CLUTCH HOUSING



Removal

Separate the engine from the clutch housing and the clutch housing from the transmission. Remove the lock from the idler gear shaft and pull shaft from clutch housing. Remove the oil slinger from the clutch shaft gear end. Remove the retainer from the clutch shaft bearing. The shaft may then be pulled toward the flywheel and removed from the case. The third gear in this assembly will remain on the main transmission shaft where it is retained by two snap rings. The idler gear is mounted on two needle bearings and these may be pressed from the gear if necessary. Remove the snap ring from the clutch shaft and press the bearing from the clutch shaft.

Inspection

Check the gear teeth and splines for wear. Check the needle bearings for wear and roughness. The maximum allowable wear is .007". Check the clutch shaft bearing for roughness or pitting. This bearing should be replaced if worn .006" or more. Check the clutch shaft, pilot bearing surface and the pilot bearing in the flywheel. The bearing or shaft, or both, should be replaced if the clearance exceeds .010". Use a new oil seal at the clutch shaft.

Assembly

Place the oil seal in the retainer with the lip toward the oil supply. Place the clutch shaft bearing on the shaft with the snap ring toward the splined end of the shaft. Place the idler gear in the case with the two thrust washers between the case and the gear. The thrust washer on the front side of the gear or away from the flywheel has a turned-over lip which is used to prevent it from turning.

FLYWHEEL AND STARTER RING GEAR

Removal

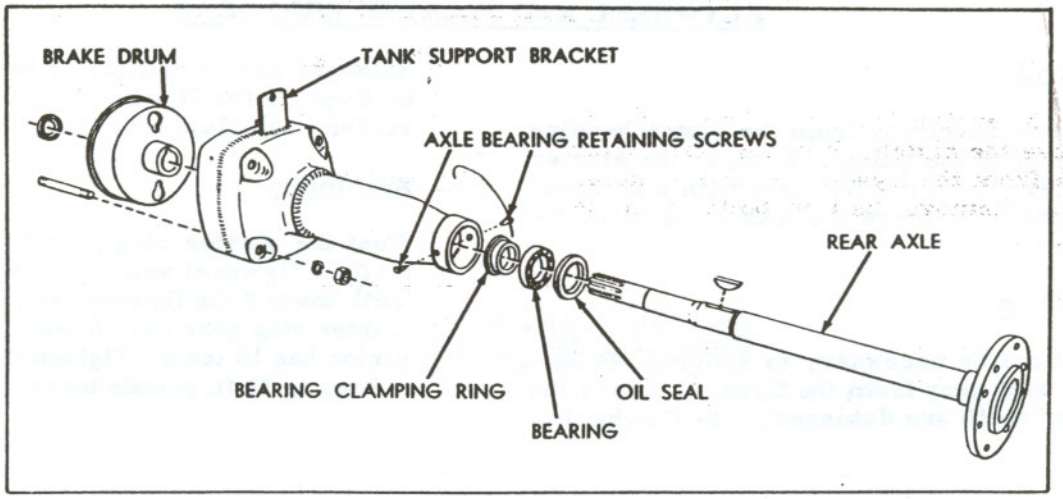
Separate the engine from the clutch housing and remove the clutch. Remove the starter ring gear from the flywheel with a hammer and punch. Remove the four bolts from the flywheel.

Inspection

It will not be necessary to remove the flywheel ring gear from the flywheel unless the starter teeth are damaged. The flywheel is balanced and no drilling or machining should be done to the flywheel. Check the clutch surface for flatness.

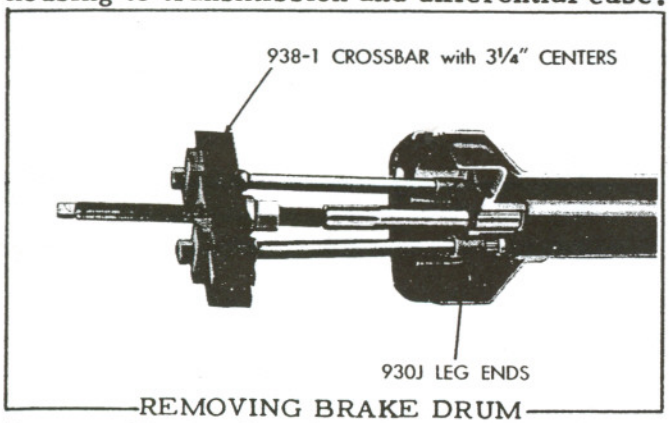
Assembly

Heat the starter ring gear to 550°F and install on flywheel with the beveled end of the teeth toward the flywheel end of engine. The starter ring gear has 86 teeth and the starter pinion has 10 teeth. Tighten the flywheel capscrews to 55 ft. pounds torque.



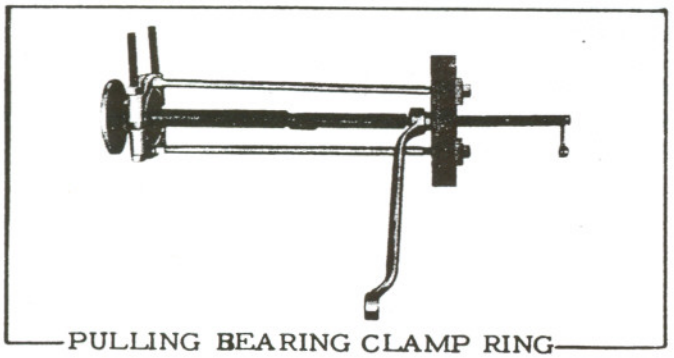
Removal

Drain transmission to prevent oil from contacting brake bands. Remove the rear wheel to prevent damage to oil seals. When removing the left hand axle housing, the clutch pedal rod must be removed. Remove the bolt from the gas tank support and the four nuts attaching housing to transmission and differential case.



REMOVING BRAKE DRUM

Remove the two bearing clamp ring retaining screws from the outer end of axle and attach the OTC puller as shown and pull brake drum from shaft. To remove the cast drum use OTC 20M adaptor (5/8" male NC and 5/8" female NF) in place of the 930J leg ends. To replace oil seal or bearing, pull the bearing clamp ring from the axle shaft.



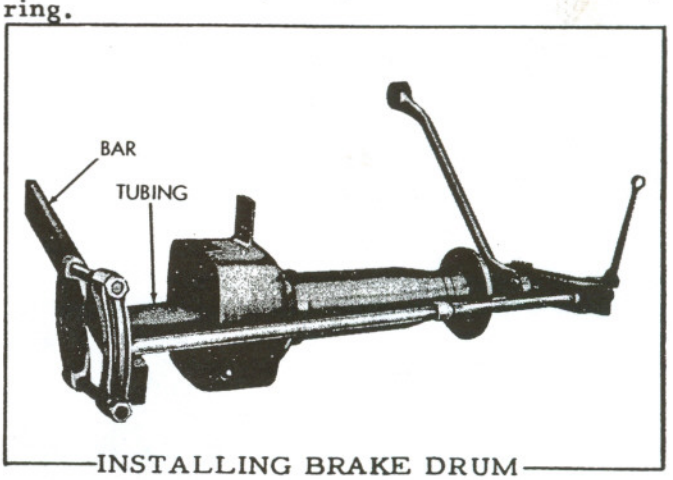
PULLING BEARING CLAMP RING

Inspection

Always use a new oil seal. Check the brake drum for scoring.

Assembly

Place the oil seal on the axle with the lip towards the bearing. Place bearing on the axle with the shielded side away from the seal. Pack the bearing with chassis lubricant. Install the bearing clamp ring with the small end towards the bearing. Always use a new clamp ring. The axle is retained by the press fit of the clamp ring.

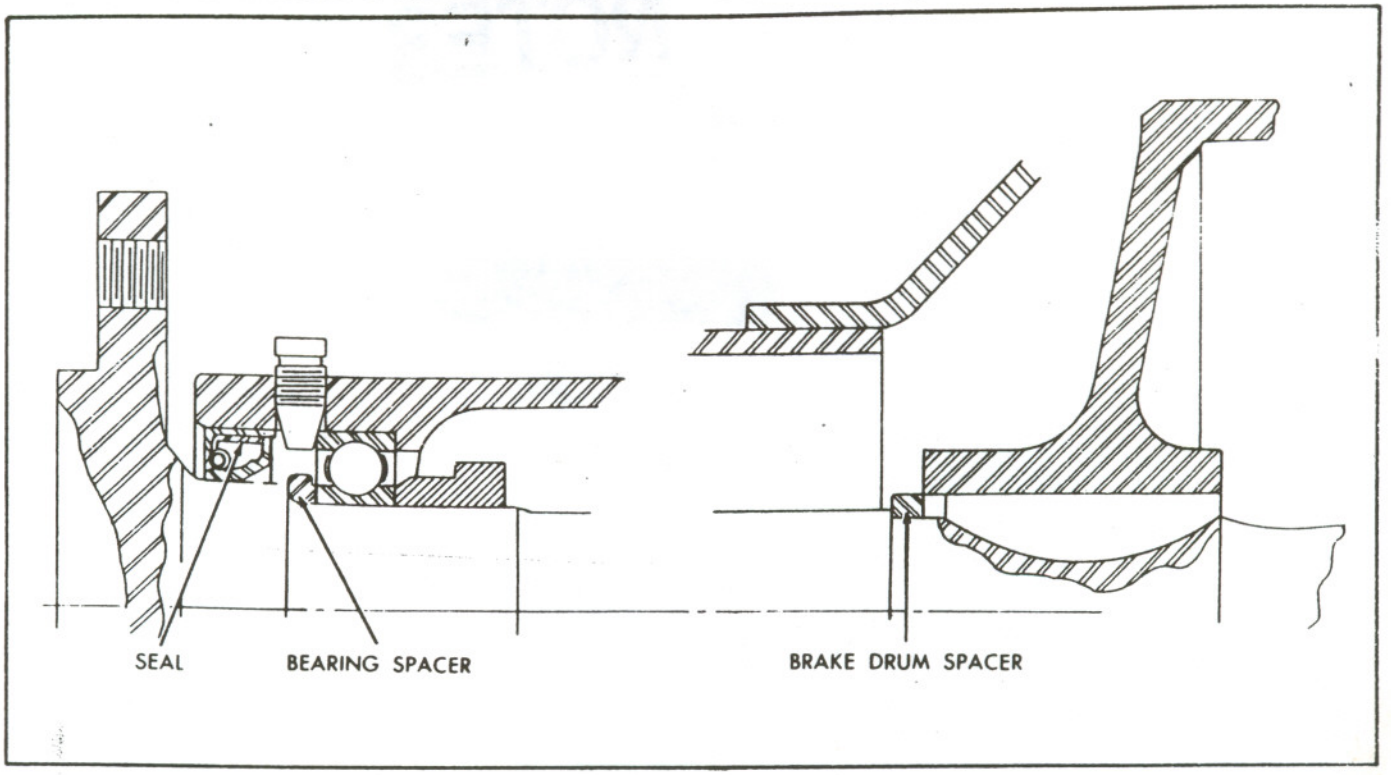


INSTALLING BRAKE DRUM

Install the axle in the housing. Tighten the bearing retaining screws to 10 ft. lbs. Lock with lacing wire.

Install the brake drum using a piece of 1-1/4" tubing 8" long and a heavy bar of iron in the OTC puller as shown.

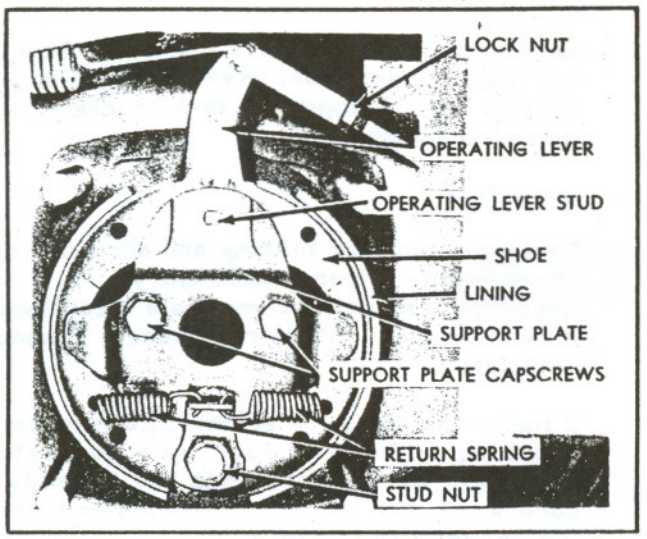
A new Rear Axle Kit 800902 has been provided for service. It consists of the axle, a new oil seal 800906, a bearing spacer 800904, and a brake drum spacer 800905.



TO INSTALL

Place oil seal on axle with seal lip towards axle flange. Place the large diameter spacer on axle with the inner curved radius towards the seal. Install bearing and bearing retainer. Install the axle in the housing, being sure the seal is pressed against the counterbore. If seal is not seated properly, the seal lip will ride up on flange radius damaging the seal. Place the smaller drum spacer on axle with square side towards drum. Heat drum and press into place.

NOTES



Removal

Remove the wheel and axle housing assembly. Disconnect the brake pedal return spring and the brake shoe return springs. The shoes may now be lifted out. If the lever mechanism is to be removed, remove the brake support plate.

Check the lining for wear. It must be replaced when worn down to the rivet heads.

Check the brake lever cam for wear. If worn until adjusting brakes is difficult, either in the cam surface or hinge points the parts should be replaced.

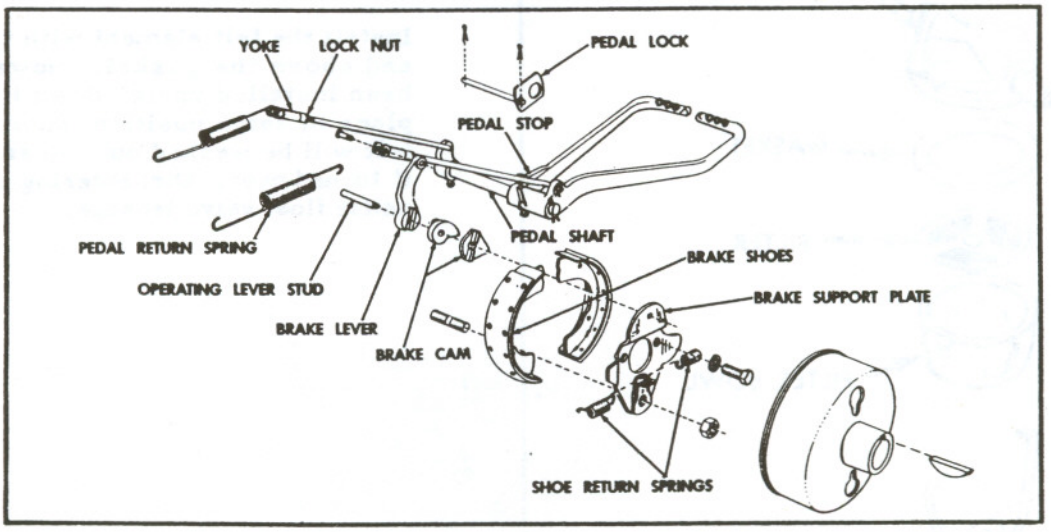
Assembly

Tighten the support plate capscrews to 55 ft. lbs. torque and the support stud nut to 100 ft. lbs. torque.

Rivet the lining to the shoe, placing the rivet head in the lining and upset with special punch on inner surface of the shoe.

The shoes are all alike and may be used in either front or back. However there is a top and bottom. The top of the shoe may be identified by the cutout section in the cam surface. The lining extends to the lower end of shoe. There are two holes in the lower end of shoe. One of these, the top, is used to attach the shoe return springs.

BRAKE PEDAL ADJUSTMENT

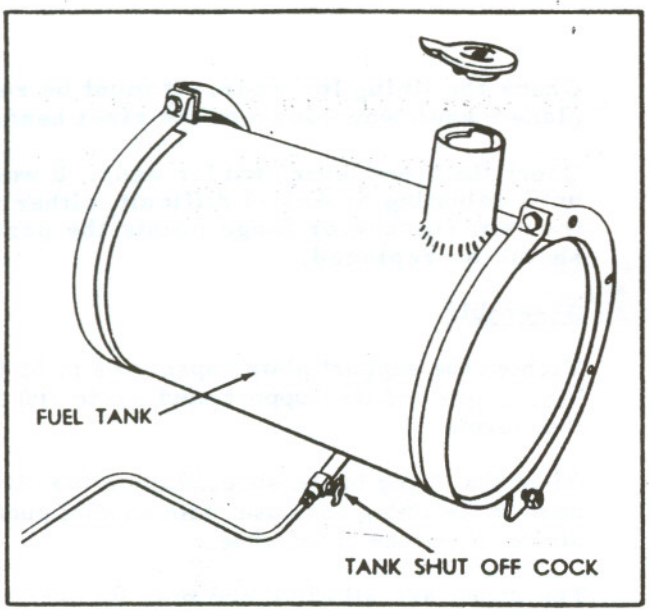


When new pedals are installed, the pedal stops must be filed to stop the pedal, approximately four inches below the seat attaching pad and to have the pedals level with each other.

Brake pedal parts should be replaced when wear makes adjusting brakes difficult.

The pedal lock is on the left hand brake only. The brakes may be adjusted by loosening the lock nut on the yoke at the rear end of brake rod. Raise wheel from floor and remove rod from pedal and turn into yoke end to tighten brake. The pedal should have approximately 1-1/2" movement (by hand) before brake is applied, or a slight drag. Enter the rod in pedal from the left hand side. The threaded section of rod will provide enough adjustment to wear lining down to the rivet heads. Adjust left brake first. Adjust the right brake until pedals are level and have equal travel.

FUEL TANK



Removal

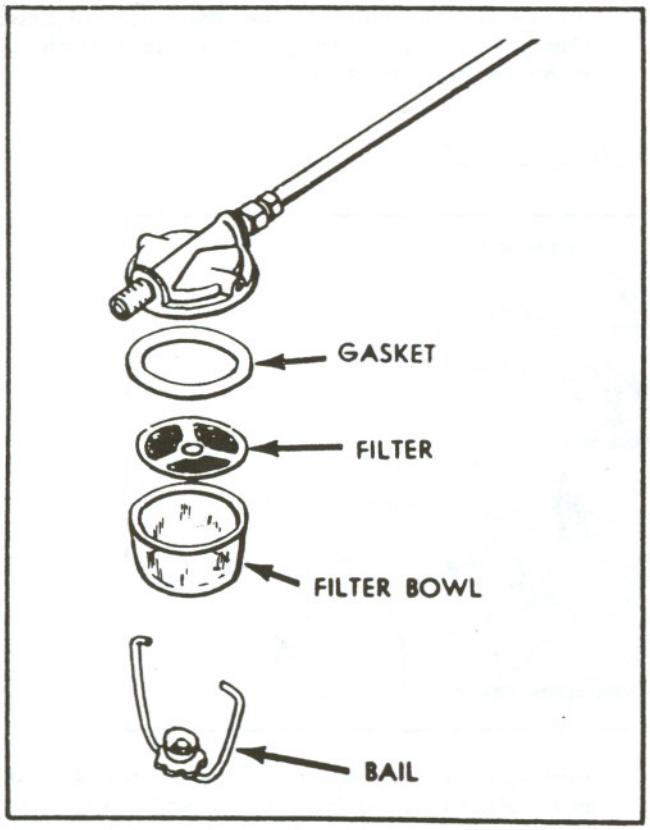
Remove the hood, fenders and seat. Shut off fuel valve under tank. Remove the seat and the fuel line. Remove the tank brackets from the axle housings.

Inspection

Check the tank for leaking and accumulation of sediment. Clean if necessary.
Check the tank cap for vent hole cleanliness. It must be open. Check cap gasket. It should seal tightly.

If fuel tanks are to be soldered, use extreme caution, or have it done by a competent mechanic who understands the hazards of such work and has the facilities to reduce the hazards to a minimum.

FUEL FILTER

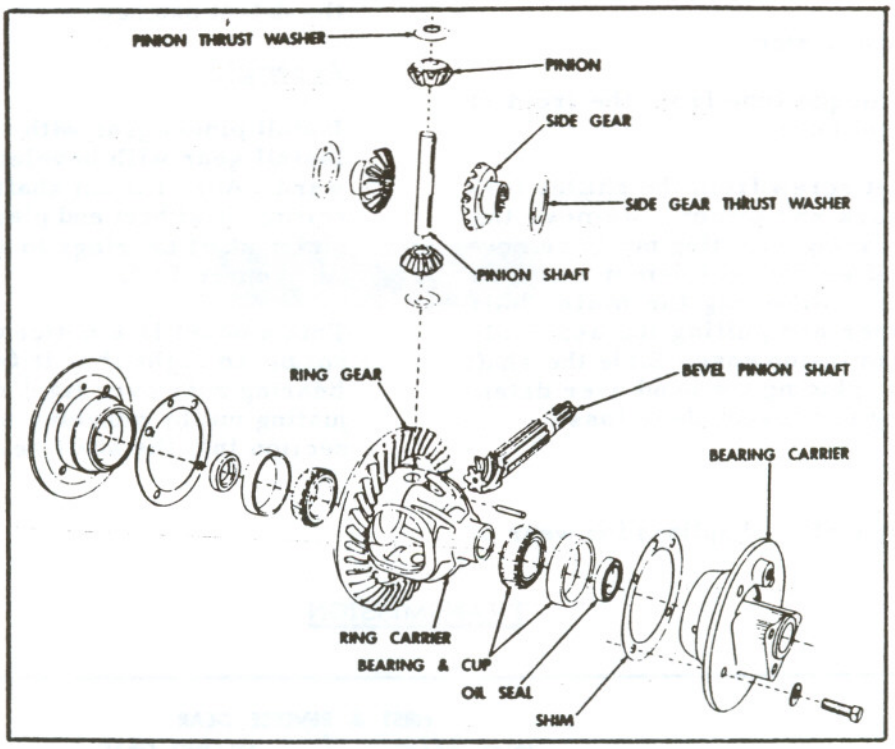


Shut off the fuel cock under tank and remove fuel line, carburetor and fuel filter.

Clean the filter thoroughly. The filter is a felt element and is very effective. If it plugs rapidly it indicates better methods of fuel handling should be employed.

Install the felt element with the web side up and above the gasket. However, if it has been installed upside down it is best to replace in same position, as dirt collected in felt will be washed out and enter carburetor if turned over. Dirt entering carburetor may cause float valve leakage.

DIFFERENTIAL



Removal

Drain the transmission, remove the clutch housing and engine assembly. Remove the wheel and axle housings. Remove the brakes and brake support plates. Remove the differential bearing carriers.

Pull the bearings from the carrier. Remove the pin from the pinion shaft and remove the shaft. The pinions, side gears and thrust washers may be moved around to open side of carrier and removed after the shaft is out.

Inspection

Check the gear teeth and bearings for wear, roughness or pitting. Check the pinion and side gears for backlash clearance. They should be replaced if backlash is more than .015" and cannot be compensated by new thrust washers. Check face of pinions and side gears and thrust washers and thrust washer surface in carrier for scoring. Always use new oil seals.

Assembly

If a new ring gear is riveted to the carrier it should be cold riveted. Place the side gears and pinions in carrier. Rivet the pinion shaft keeper pin by distorting end of hole. The gears should have about .005" backlash or turned or caused to revolve with a lever not more than one foot long.

Place the assembly in the case with the ring gear on the left hand side.

Adjust the bearings by use of the correct number of shims between the bearing carriers and transmission case. Adjust to a free rolling fit without end play or binding.

After the bearings are adjusted, the ring gear mesh may be adjusted by removing a shim from one side and installing it on the opposite side. The backlash clearance should be from .004" to .007". Use a nonsetting sealer between shims and between shims and case and carrier to prevent grease leakage.

SPECIAL LOW GEAR

Removal

Drain the transmission

Separate the torque tube from the front of the transmission case.

Remove the set screw from the shifter fork and remove fork and pinion. Remove the pinion shaft bearing adjusting nut to remove gear. The shifter rod and detent ball may be removed by removing the main shaft bearing retainer and pulling the assembly from the transmission case. Slide the shaft from retainer, placing the hand over detent ball and spring to prevent their loss.

Inspection

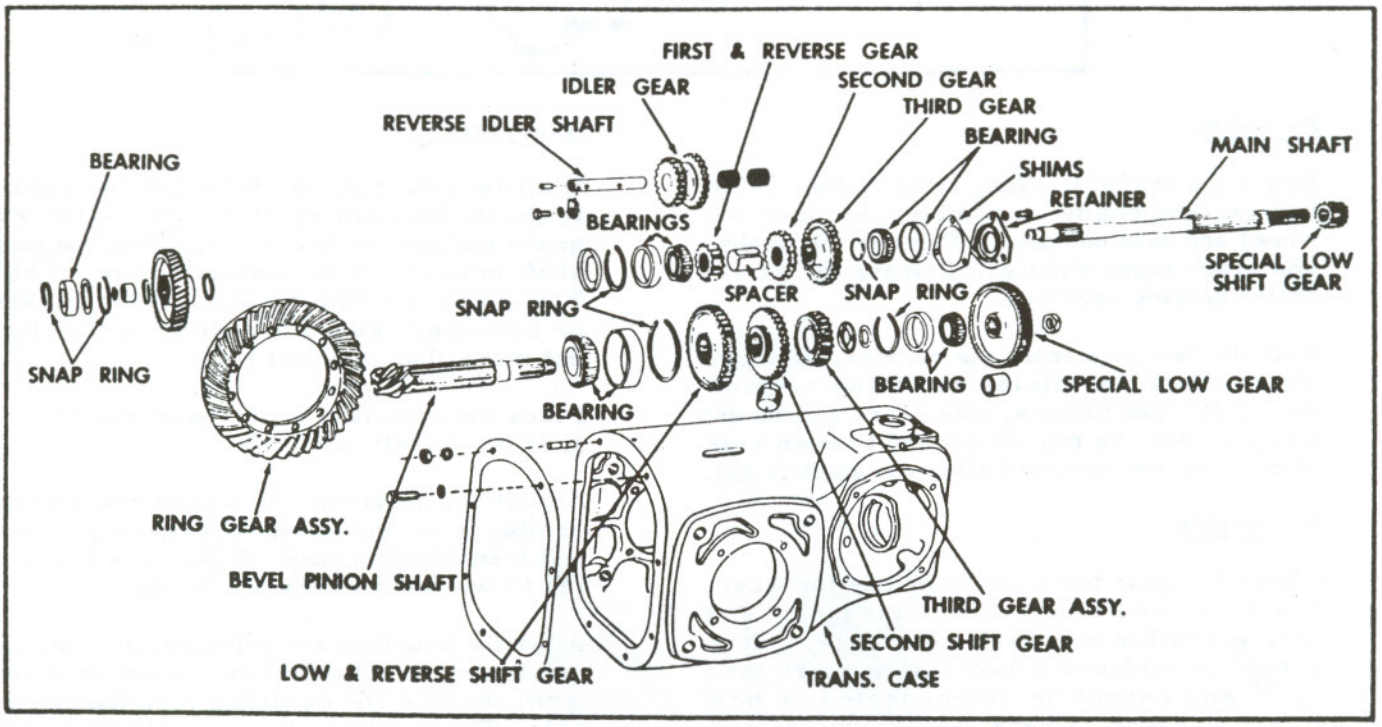
Check the gear teeth and splines for wear or chipping. Check the shifter shaft for wear at the detent notches.

Assembly

Install pinion gear with shift collar forward. Install gear with beveled ends of teeth forward. Adjust main shaft bearings to a free rolling fit without end play or binding. Adjust pinion shaft bearings to a slightly preloaded fit (8 ounce Ft.).

This amount is a noticeable drag, but must not be so tight that it feels as though the bearing runs over tight spots. Lock the adjusting nut by punching a portion of the thin section into the shaft keyway.

TRANSMISSION



Removal

Separate engine and clutch housing assembly from transmission case. Separate torque tube from transmission case. Remove the rear axle assemblies, brakes and brake support plates and differential. Remove the gear shifter mechanism.

Remove the main shaft bearing retainer at front of case and slide shaft forward, removing gears from the shifter opening. Remove the adjusting nut and slide pinion from rear of case and gears from the shifter opening. Remove the lock from the reverse idler shaft and pull shaft to rear of case. This shaft is threaded for a puller if required.

Inspection

Check the bearings for wear, chipping or rough cups and rollers. Check gears for

wear and chipped or rough teeth. Check the shafts for worn splines.

Assembly

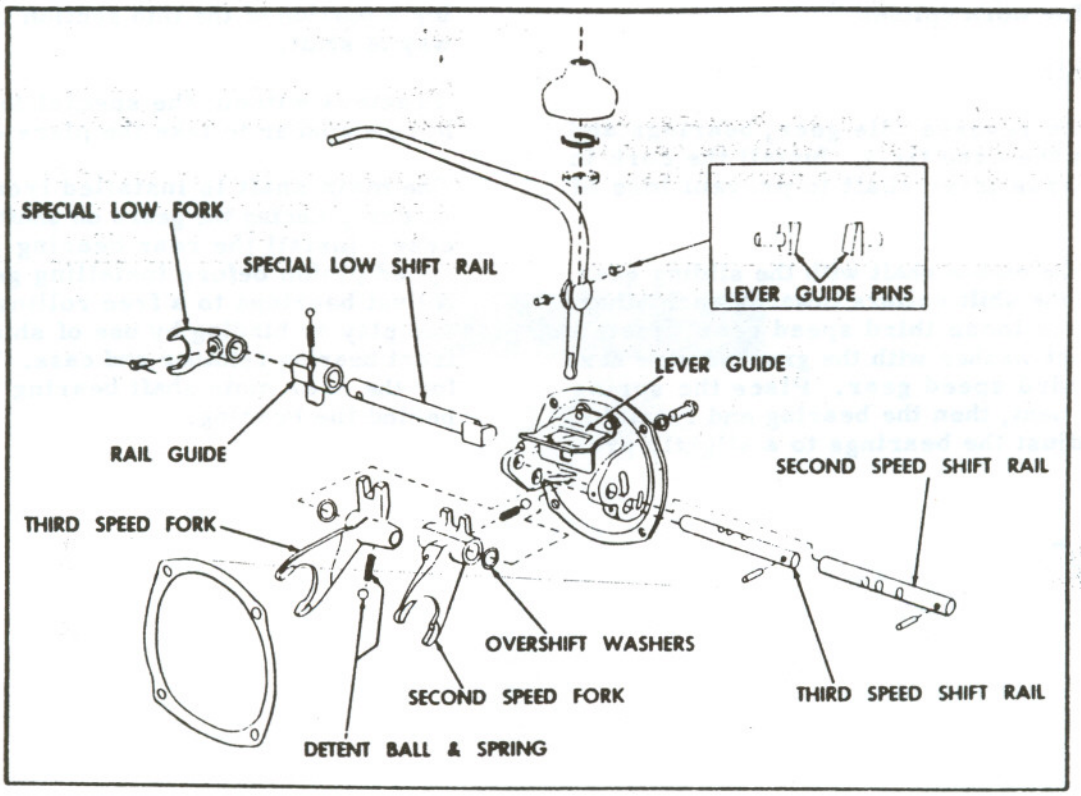
Place the reverse idle gear, bearings and shaft in the case first. Install the cork in the reverse idler shaft to prevent loss of oil.

Install the pinion shaft with the sliding gear, placing the shift collars towards each other. Install the loose third speed gear. Install the thrust washer with the grooved side next to the third speed gear. Place the spring washer next, then the bearing and retaining nut. Adjust the bearings to a slightly pre-loaded fit, 8 ounce ft. Lock the nut by driving a portion of the thin section into the keyway of shaft.

Tractors without the special low gear will have a spacer to take the place of the gear.

The main shaft is installed from the front of case, placing the gears on shaft as it enters case. Install the rear bearing and the low speed pinion before installing gear spacer. Adjust bearings to a free rolling fit without end play or binding by use of shims between front bearing retainer and case. The oil dam for the rear main shaft bearing is installed behind the bearing.

GEAR SHIFT MECHANISM



The gear shift is the same as used on the Model "B-C", except, the guide plate is notched for the special low gear and the lever is shaped differently and guide pins are used to control lever.

Removal

Remove the seal boot from lever, and remove the snap ring from transmission case. The lever and retainer can be lifted from the case. After the lever is out, the two lever guide pins may be removed.

Remove the four screws attaching the shift mechanism to right side of transmission case.

Note the position of the overshift washers.

To remove shift rails pull the retaining pins from cover. If they cannot be pulled, drive them on through and cut off excess as it strikes cover.

Inspection

Check shift rails for wear at detent notches. Check forks for wear at gear contact section and lever contact section.

The shift lever guide must be centered to line up with shifter slots in both forks. The edges of guide may not be worn excessively. If either case exists the guide worn excessively or guide not lining up it may be possible to shift into two gears at once.

Assembly

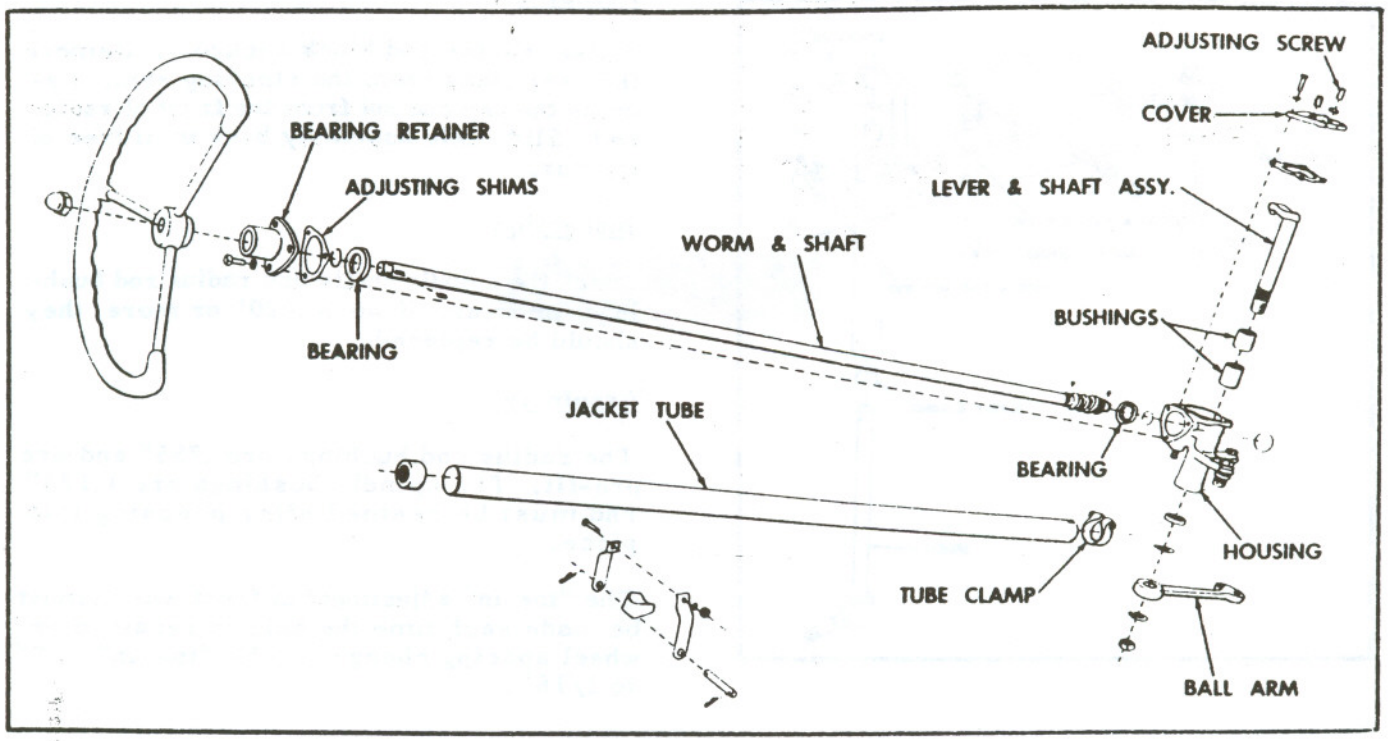
The third speed shift rail can be identified by the three notches. The two front notches are very close together. The notches are at right angles to the retaining pin hole. The third speed fork has the high shift lug. The fork is installed with the fork towards front of case and shaft in R.H. position.

The low speed shift rail has three notches in line with the retaining pin hole.

The overshift washers should be replaced just as they are removed. They are used back of the third speed fork or in front of the low speed fork, as required, to prevent gears from rubbing when in the "in gear" position.

The gear shift lever guide pins are cut diagonally and must be installed correctly. The right hand pin is installed with the narrow side of the head up. The left hand pin is installed with the narrow side of head down.

If the tractor is not equipped with the special low gears, these pins may be turned over, and will prevent the shift lever from entering the slot in shift lever guide.



Removal

Remove the steering gear ball arm and the two screws attaching steering gear to frame. Remove the four cover capscrews, cover and lever shaft. Remove the steering gear wheel and loosen jacket clamp. Slide jacket tube up and remove the four capscrews on bearing retainer.

Inspection

Check bearings for wear and roughness. Check the cam and worm for wear and scoring. Check the lever shaft bearings for wear.

Steering gear parts must not be worn excessively or steering adjustment will be difficult.

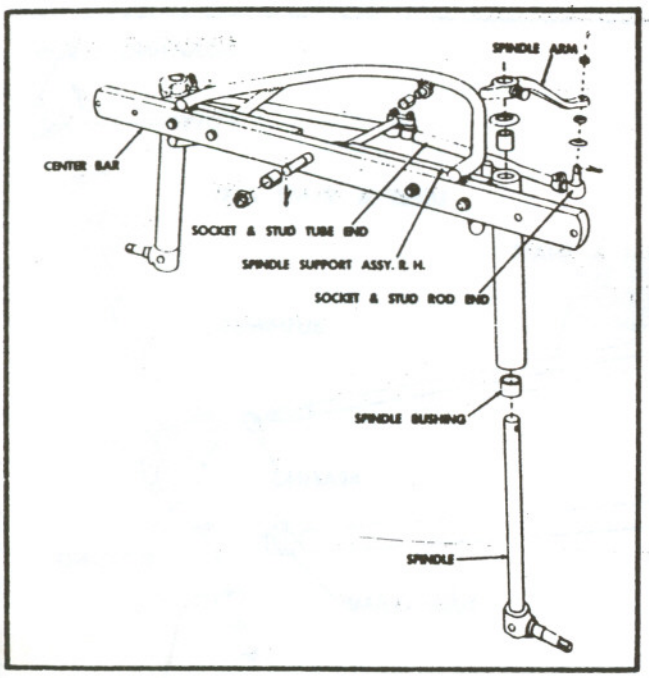
Assembly

Install the worm shaft and adjust bearings to a free rolling fit without end play or binding by use of shims between bearing retainer and housing. Install jacket tube with the notch in lower end "up" to prevent grease leakage. Adjust the length of tube to reach into recess of steering wheel. It must not touch wheel or it will cause binding.

Back out the lever shaft adjusting screw and install lever shaft and cover. Count the number of turns from full right to full left, then turn back half these turns to mid-position. At mid-position, adjust mesh between worm and lever shaft to .001" and secure lock nut.

When placed on the tractor the steering wheel should have the first spoke to left of cut-out section straight up or vertical. This places the cut-out section between the 12 o'clock and four o'clock position where greatest advantage in vision is obtained. This adjustment is made by lengthening one tie rod and shortening the other as required. Maintain the "toe-in" of 0" to 1/16" while making this adjustment. Lubricate the slip joints of socket and stud rod end to prevent rusting.

FRONT AXLE AND SPINDLES



Removal

Raise tractor and block securely. Remove the drag links from the steering arm. Remove the key and nut from the front of radius rod. Slide axle assembly back until free of tractor.

Inspection

Check the spindle shafts and radius rod bushings for wear. If worn .020" or more, they should be replaced.

Assembly

The radius rod bushings are .755" and are pre-fit. The spindle bushings are 1.126" and must be reamed after pressing into place.

The "toe-in" adjustment of front wheels must be made each time the axle is repaired or wheel spacing changed. The "toe-in" is 0" to 1/16".

FRONT WHEELS

Removal

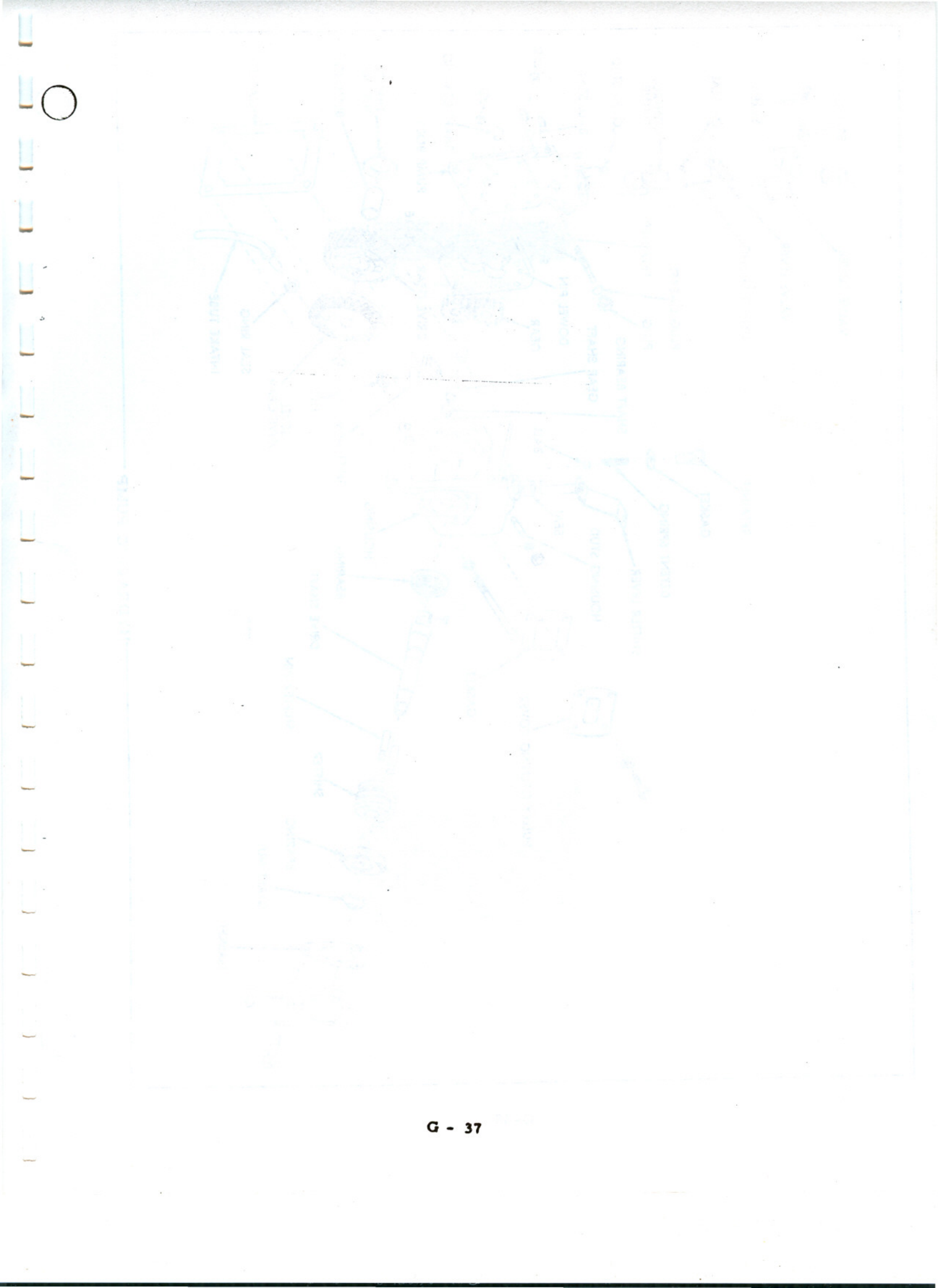
Raise the front wheel from floor and block solidly. Remove the hub cap, key and nut from axle. Pull wheel. Pull inner bearing and oil seal. The bearing cups may be driven from hub.

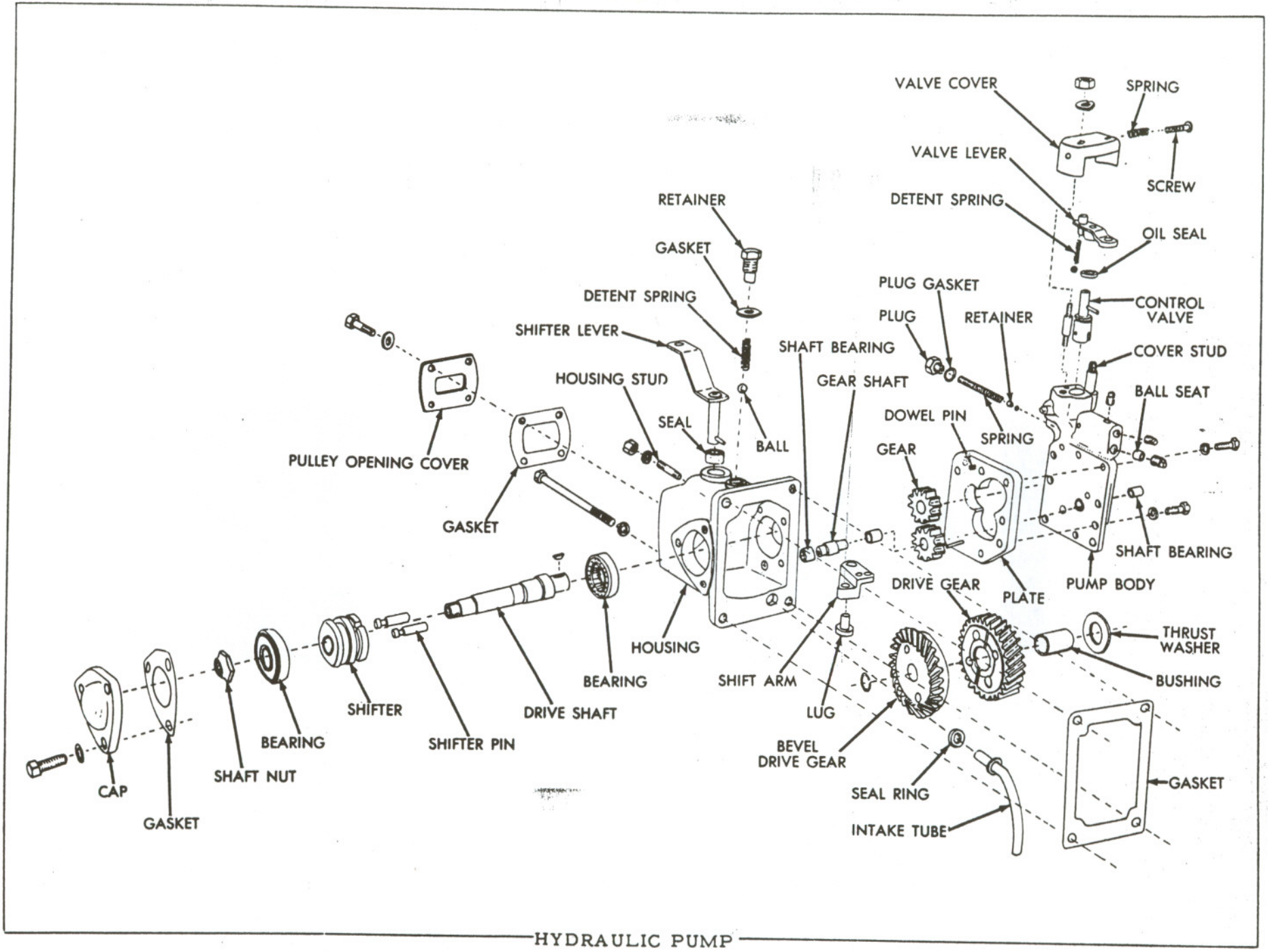
Inspection

Check the bearings for wear, chipping and roughness.

Assembly

Always use a new oil seal. Clean the parts thoroughly and dry the bearings of cleaning fluid. Pack with #2 wheel bearing grease. Adjust bearings to a free rolling fit without end play or binding.





HYDRAULIC PUMP

MODEL "G" HYDRAULIC PUMP

General

The Model "G" Hydraulic Pump is a gear type pump and develops approximately 900 P.S.I. It is driven from the belt pulley and is mounted on the side of the belt pulley assembly.

Oil Circulation

Oil is drawn through the oil inlet tube which extends from the pump into the reduction gear section of clutch housing. Drilled passages from the tube through the belt pulley housing connects the inlet tube to the suction side of the gears.

Oil leaves the gears under pressure through drilled passages to the relief valve and control valve. Oil passes through the control valve through the drilled hole in valve which connects the pump pressure passage to ram.

When the ram is fully extended the pressure rides high enough (900) to cause the relief valve ball to leave its seat. At this time the oil passes the ball and returns to the sump through drilled passage at "B".

When the pump bypasses the control lever should be released immediately. The control lever spring will then return the control valve to the hold position. When in the hold position the valve is turned so the drilled hole does not line up with oil passages. This traps the oil in ram and holds rams extended. Also the wide notch in valve lines up with pump passage and oil passes into wide notch and to lower end of valve and back to sump through hole "B". When the pressure drops the relief valve closes.

When the control lever is pushed clear down the valve is rotated further until both the narrow and wide notches in valve lines up with the pump drilled passage. At this time the pump continues to force oil through wide notch and under valve back to sump through passage "B". Also at the same time oil from ram is released through the narrow notch and back to sump.

A screw is provided on the pump control lever to regulate rate of drop. Turning screw in slows rate of drop. The belt pulley and pump is of the clutch type. To shift, depress clutch pedal and move shift lever towards rear of tractor.

Pump Removal

Disconnect the ram hose or hoses, remove control linkage, remove capscrews attaching belt pulley assembly to tractor.

Pump Disassembly

Remove the pulley and pinion assembly. The surfaces of the pump body, gear plate and pulley housing are lap fits and mated together with dowel pins. No gaskets are used. Use great care when separating these parts to prevent damage to lapped surface.

The idler pump gear is pressed onto its shaft and the shaft is mounted in needle bearings. The pump drive gear is keyed to the shaft.

Remove the cover from the control lever. Drive the taper groove pin from the lever and valve and remove lever. The valve has an "O" ring seal and may be a little difficult but can be pulled from body.

Remove the pipe plugs from the relief valve bore and remove relief valve spring, ball seat and ball. Relief valve seat may be driven from body from spring side. (Enter punch in spring side).

To remove pump and pulley drive shaft, remove the detent spring and ball from shift lever. Remove the bearing cap from housing. Remove nut on end of shaft and remove the ball bearing.

Move shift collar towards bearing and remove shift pins. Move the shaft assembly towards cap side of housing until shaft is out of the roller bearing on the opposite end. Angle shaft and bring gears and shaft out through large opening in the pulley housing.

Press the bevel gear from shaft and idler gear and thrust washer may be removed.

Remove the taper pin from the shifter and shifter shaft and pull lever and shaft assembly from the housing.

Inspection

Check the bearings for wear and roughness. Check gears for wear and roughness. Check the idler gear thrust washer for wear. Check the shifter collar and pins for wear.

Check the pump gears for wear and end play. The gear clearance should be .002" to .004". Measure the thickness of gear and gear plate to determine clearance. Gear backlash should not be excessive. If the relief valve is seating properly and not leaking the pump should develop approximately 900 lbs. pressure. If it does not the cause will be found in excessive gear backlash or end clearance.

The relief valve spring should measure 3-13/16" long - free length. If 3/16" short it should be replaced. Always use new oil seals and "O" rings.

Assembly

Place the idler gear thrust washer on the shaft. Place idler gear next with shift pin holes with counterbored ends towards bevel gear. Install bevel gear key and press bevel gear on shaft. The idler gear should turn free without excessive end play. Place roller bearing in housing. Enter shaft assembly and place shifter and pins in position. Place ball bearing in position with long side of bearing from snap ring towards the gear. Tighten shaft nut securely and lock by depressing a portion of the thin section into shaft keyway. This bearing is a semi-thrust bearing and holds the end play of shaft. Install cover using sealer.

Install shift lever and seal in housing with lever pointed away from tractor and inside shift lever towards tractor with swivel in shifter collar groove. Drive taper pin into place. Install detent ball, spring and plug.

Place the pump drive gear key and drive gear on pump drive shaft. Install one needle bearing in drive housing and one in pump cover housing.

Use sealer on outside of needle bearing. Be sure this sealer does not enter bearing. Press pump idle gear on shaft, locating it in center of shaft.

Clean the lapped surfaces of pump body, gear section and housing throughly and place parts together on the 1/4" dowel pins. Late style pumps have 5/8" dowel pins. Bushings are provided for installing repair parts on pumps having 5/8" holes and 1/4" dowel pins. Start the capscrews and tighten evenly to 30 ft. lbs.

If lapped surfaces are scratched or marred or dirt on surface or capscrews tightened unevenly the pump will leak.

Seat the relief valve ball in its seat before assembly. Use a soft punch and use a solid blow. Drive seat into place in side of body closest to tractor. Drive to bottom. Enter ball, ball spring guide, spring and retaining plug from opposite side.

Install control valve with wide notch towards tractor side of pump. Install oil seal and control lever, detent ball and spring and cover assembly.

The screw & spring in control lever cover is used to secure slow rate of drop. Turning in on screw lowers rate of drop.

A valve is placed in the remote ram line to secure delayed lift of rear furrowing bar . closing this valve partially, increases delay.

BELT PULLEY (NEW STYLE)

Remove the four capscrews attaching the assembly to the belt pulley and pump housing. Remove sheave, shaft nut cover and nut. Pull the pulley drive flange. Press shaft from housing. Press bearing from shaft and drive bearing cups from housing. The snap rings may be left in place.

Inspection

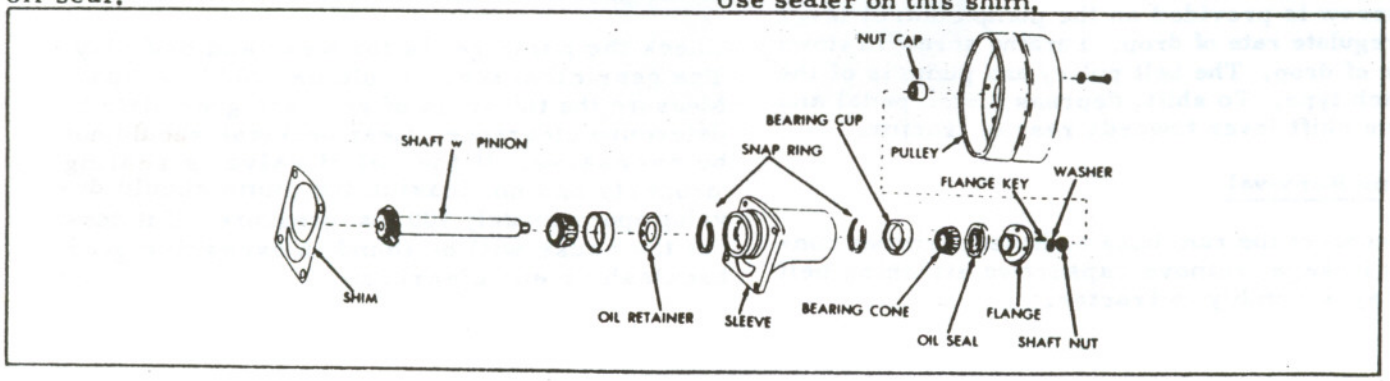
Inspect gear teeth for wear, and roughness. Check bearings for wear, roughness or scoring. Check oil seal surface on pulley hub. Replace oil seal.

Assembly

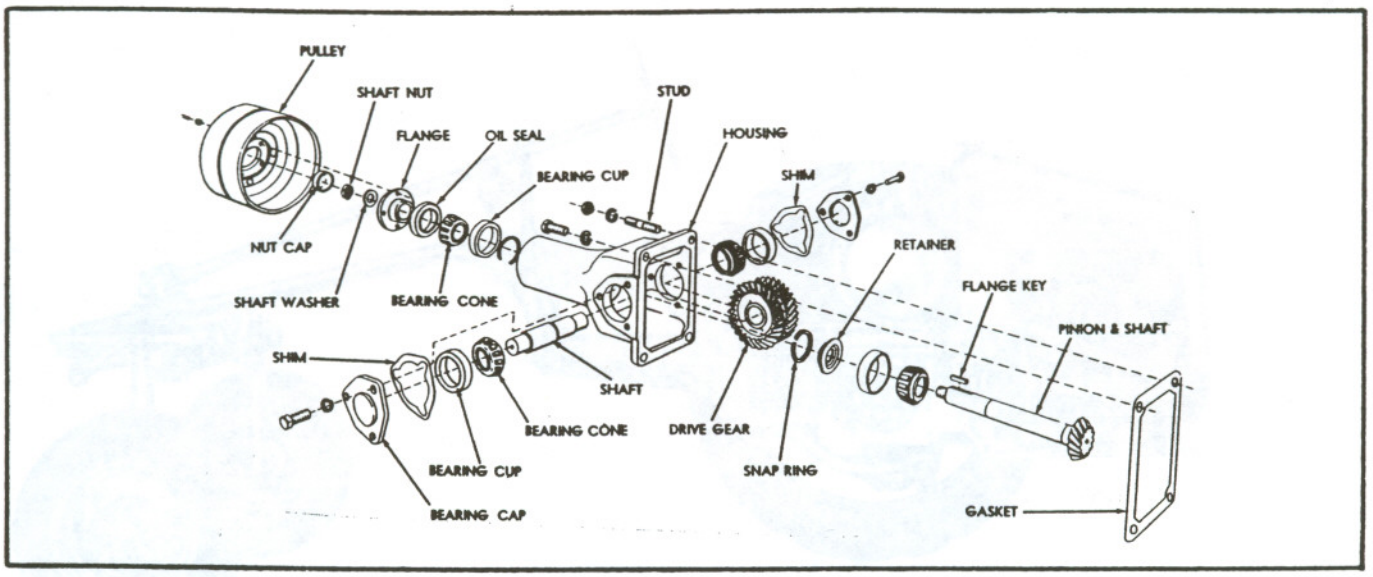
Assemble in reverse of above. Place the bearing shield washer with the concave side towards gear end of shaft and behind bearing cup. Install seal with lip towards bearing.

Adjust bearings to a free rolling fit without end play or binding. Lock nut by depressing a portion of the thin section into shaft keyway.

Adjust bevel pinion and gear mesh to .005" to .010" backlash by use of shims between housings. Use sealer on this shim.



BELT PULLEY (OLD STYLE)



Removal

Remove the four capscrews attaching the pulley assembly to the clutch housing. Remove the cap from pinion shaft and remove the bearing adjusting nut and pull pulley hub.

Remove the caps from the bevel gear shaft bearings. Move gear away from pinion as far as possible. Place two solid blocks between gear and case on pinion side of gear. Press shaft from gear. Pull pinion from case. Remove oil seal and bearing cups. It will not be necessary to remove the snap rings.

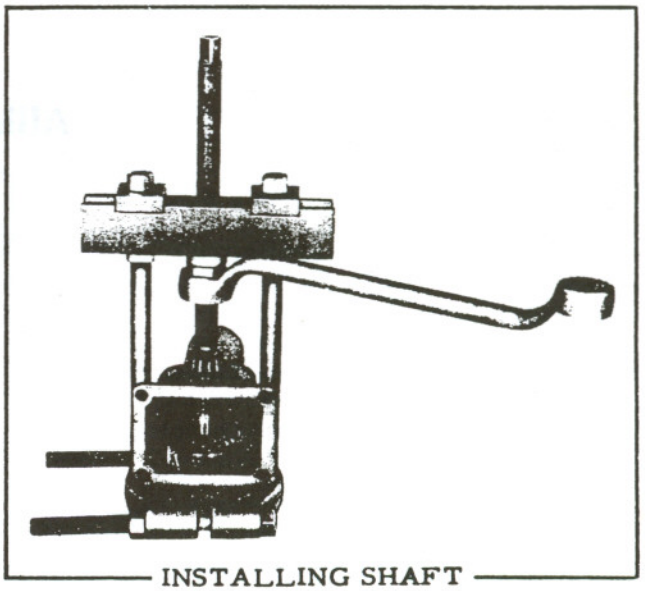
Inspection

Check the bearings for wear, rough or chipped rollers. Check gear teeth for wear or chipping. Always use new oil seal.

Assembly

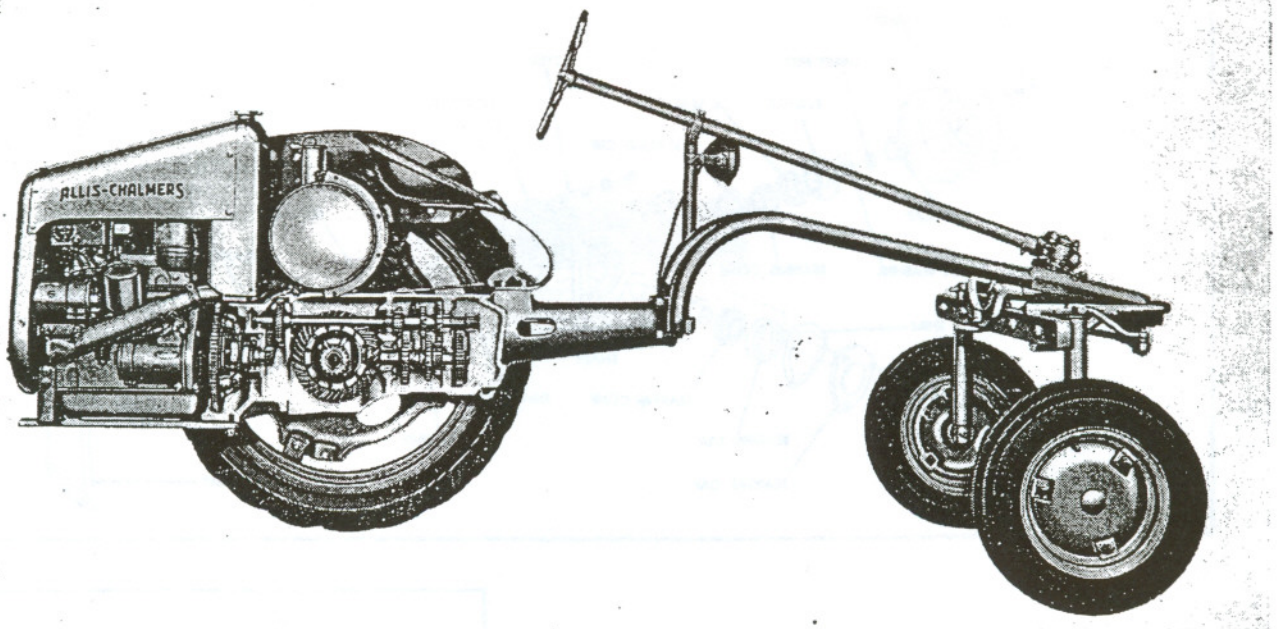
Install the pinion in case and the oil seal with lip towards pinion end of shaft. Adjust bearings to a free rolling fit without end play or binding. Lock the bearing adjusting nut by punching a section of the thin flange into the shaft keyway. Install the seal cap over nut.

Place the bevel gear in case and press shaft in against shoulder. Install bearings and retainers. Adjust bearings to a free rolling fit without end play or binding, by use of shims between retainers and case. Adjust gear backlash to .004" to .007" by removing shim from one retainer and installing under opposite retainer. This method will maintain correct bearing adjustment while securing correct backlash.



INSTALLING SHAFT

Use the gasket provided, which is hard paper .010" thick between pulley and clutch housing. If a single gasket does not give a gear backlash of .004" to .007" as required, use additional gaskets.



Allis-Chalmers "G"